1923-24.

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA.

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

REPORT

TOGETHER WITH

MINUTES OF EVIDENCE

RELATING TO THE PROPOSED

ESTABLISHMENT OF OIL DEPÔTS, DARWIN.

Presented pursuant to Statute; ordered to be printed, , 1924.

[*Cost of Paper*:—Preparation, not given; copies; approximate cost of printing and publishing, £ .]

Printed and Published for the GOVERNMENT of the COMMONWEALTH OF AUSTRALIA by ALBERT J. MULLETT, Government Printer for the State of Victoria.

No. .—F.12831.—PRICE

MEMBERS OF THE PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS.

(Fourth Committee.)

The Honorable HENRY GREGORY, M.P., Chairman.

Senate.	*House of Representatives.*
Senator John Barnes.†	Arthur Blakeley, Esq., M.P.
Senator Hattil Spencer Foll.‡	Robert Cook, Esq., M.P.
Senator Patrick Joseph Lynch.†	David Sydney Jackson, Esq., M.P.
Senator John Newland.‡	George Hugh Mackay, Esq., M.P.
Senator William Plain.*	James Mathews, Esq., M.P.
Senator Matthew Reid.†	

* Ceased to be a Member of the Senate, 30th June, 1923. † Appointed 5th July, 1923. ‡ Resigned, 23th June, 1923.

INDEX.

EXTRACT FROM THE VOTES AND PROCEEDINGS OF THE HOUSE OF REPRESENTATIVES, No. 21, DATED 19TH JULY, 1923.

11. PUBLIC WORKS COMMITTEE—REFERENCE OF WORK.— . . . . OIL DEPÔTS, DARWIN.—Mr. Stewart (Minister for Works and Railways) moved, pursuant to notice, That, in accordance with the provisions of the *Commonwealth Public Works Committee Act* 1913-1921, the following work be referred to the Committee for investigation and report, viz.:—

* * * * * * * * * * * * *

Establishment of Oil Depôts, Darwin.

Mr. Stewart having laid on the Table plans, &c., and a Report by Engineer Vice-Admiral Sir William Clarkson, in connexion with the proposed work—

Question—put and passed.

LIST OF WITNESSES.

ESTABLISHMENT OF OIL DEPÔTS, DARWIN.

REPORT.

The Parliamentary Standing Committee on Public Works, to which the House of Representatives referred for investigation and report, the question of the establishment of Oil Depôts at Darwin, has the honour to report as follows:—

PROPOSAL.

1. The proposal submitted for the consideration of the Committee is the erection at Darwin of steel tanks, in which will be stored fuel oil and petrol available for Naval, Government, and general use.

2. The scheme provides for two tanks as a nucleus, to be added to if the demand increases. This will permit of the storage of 800 tons of petrol, and 5,000 tons of fuel oil. It is suggested that the fuel oil and petrol be brought in bulk from Borneo (four or five days' steam away), and be pumped from the steamer to the tanks.

REASONS FOR THE PROPOSAL.

3. The reasons given for the proposal are that the provision of cheap fuel and motor spirit are vital matters in connexion with the development of the Northern Territory; coal is at an almost prohibitive price, and petrol is also retailed at a rate which, with freight added, places it beyond the reach of ordinary users in the interior. It is submitted that if oil fuel could be made available at a reasonable rate, it would reduce the operating costs of the Railways, the Meat Works, and other possible users, while the provision of cheap petrol would enable motor-driven vehicles to be much more freely used, the cost of transport lessened, and the development of the Territory assisted.

ESTIMATED COST.

4. The estimated cost of the establishment of two tanks and the laying of the necessary pipe line as submitted to the Committee was as follows:—

	£
Fuel Oil Tank	6,300
Petrol Tank	1,900
Foundations	1,500
Pipe Line	2,300
	12,000

COMMITTEE'S INVESTIGATIONS.

5. The Committee went carefully into this proposal, and a Sectional Committee which visited Darwin in connexion with the proposed improvement of wharfage facilities took evidence also in regard to this project.

FUEL OIL.

6. *Price.*—It was stated in evidence that by bringing the fuel oil from Balik Pappen, Borneo, in special tank steamers carrying about 5,000 tons, it should be possible to land it at Darwin at £3 per ton. Coal has recently cost the Meat Works as much as £8 per ton delivered at the works, and the cost to the Railways at Darwin would at the present time probably be in the neighbourhood of £5 per ton. As it is held that 1 ton of oil has a heating value equivalent to 1½ tons of coal, the economy is apparent.

7. *Economy.*—Oil fuel has an additional advantage as compared with coal, in that it does not deteriorate when stored in a hot climate, and shows added economy by reason of the curtailing of handling costs, as it is pumped from the ship to the tank, and when used in the furnace it is sprayed in, thus saving stoking.

8. As an instance of economy it may be mentioned that evidence was obtained that the s.s. *Bambra*, of the Western Australian Government Line, uses, to steam 49,000 miles, 10,000 tons of coal, the cost of which is £26,000; the s.s. *Kangaroo*, which is 1,100 tons larger than the *Bambra*, steams in a year 43,000 miles on 1,550 tons of oil, which cost £5,800. In addition, the *Bambra* employs eighteen firemen and the *Kangaroo* three.

9 At Wyndham, the Committee was informed that for the purpose of refrigeration, generation of power, and firing of boilers, the value of oil is beyond question. Coal by direct charter costs them about £5 10s. per ton, and oil about £4 per ton. Careful tests have shown that they use twice as much coal by weight as oil fuel to do the same amount of work. In addition to other costs, it was stated that for every 13 tons of coal used, there is a charge of £3 for trimming, which of course is saved when oil is used.

10. *Probable Users.*—The Committee ascertained in evidence that the larger probable users of oil fuel at Darwin would be the Railways and the Meat Works. The Commonwealth Railways Commissioner stated that it would not cost a great deal to alter locomotives to make them suitable for oil burning, and that if the oil could be obtained at the price of £3 per ton mentioned, it would be an economy as against the use of coal. The establishment of the depôt purely for railway purposes was, however, in his opinion not warranted, but if it were made available for other purposes as well, he would be glad to use it, and considered it would mean a saving on present mileage of £500 per annum.

11. The representative of the Darwin Meat Works, when questioned on the subject, stated that if suitable fuel oil were made available in Darwin, his company would convert their machinery for the purpose of using it.

12. It was ascertained that the provision of a 5,000-ton tank of fuel oil at Darwin would also be of value for Naval purposes, as it is possible that in the next few years all naval ships will be oil-burning. In war-time, a store of oil at Darwin would also be of great advantage if the supply were sufficient, but in that case there would need to be ample provision for defending it against attack.

Petrol.

13. *Price.*—When Sir William Clarkson put forward his proposal to establish a bulk supply of petrol at Darwin, he pointed out that at present Darwin is supplied from Sydney. The petrol is taken from Balik Pappen to Sydney in bulk, pumped into tanks in Sydney, and from the tanks put into tins and cases and taken back to Darwin, Balik Pappen is only four and a half days' steam from Darwin, while the petrol is taken past that port to Sydney and back again, covering an unnecessary 5,000 miles travelling.

14. He advocated bringing the supplies to Darwin in bulk. From Darwin a tank waggon could be run to the head of the line, and supplies sold to users, who would bring their own 8-gallon containers. By these means it was pointed out that the present rail freight of about 8d. per gallon from Darwin to Katherine could be reduced to 2d. per gallon, and still return the Railways a handsome profit.

15 It was calculated that if the scheme suggested were adopted, it would be possible to land petrol at the head of the line at Katherine for 1s. 6d. or 2s. per gallon. At the time this proposal was put forward, the cost of petrol in Darwin was 4s. 6d. per gallon, and it was reckoned that, taking into account leakage and damage, the cost at the head of the line would be about 8s. to 10s. per gallon. Since the proposal was made, however, the Committee ascertained in evidence that the price of petrol at Darwin has been reduced from 35s. per case to 20s. 8d. per case.

16 *Probable Users.*—The Committee was informed by the Commonwealth Railways Commissioner that there was little likelihood of using petrol-driven engines on the Darwin Railways, as he considered they were still more or less in the experimental stage. Further, he stated that the cost of maintenance was high, and he would be under the necessity of employing a motor mechanic specially to attend to them.

17. The Committee, however, was furnished with interesting evidence as to the use of petrol-driven light rail motor vehicles on certain sections of the Victorian Railways. These motors cost about £2,800 and the trailers about £700 each, and it is claimed that in outback districts they give a better service at less expense than steam. Under the circumstances, the Committee is of opinion that further investigations should be made as to whether a vehicle somewhat of the same type might not with advantage be used in the Northern Territory.

18. Apart from the Railways, however, it was stated in evidence that if petrol could be obtained cheaply, there would be an increase in motor traction in the Territory that would mean cheaper transport, and one of the greatest obstacles to the development of the Territory would be removed. Evidence was tendered that on one station it cost £12 per week for wages and wood for each bore, because of the heavy cost of carting firewood by horse or donkey team. Another instance was quoted where a station had ten motor vehicles, but was not using any of them on account of the high cost of petrol.

19. *Other Work Necessary.*—Though impressed with the advantages of having cheap petrol available to assist in reducing the cost of transport in the Northern Territory, the Committee is convinced that the problem of transport will not be solved by that method alone. Hand in hand with the project there must be a systematic improvement of the roads from the various stations and settlements to the railway, including the provision of proper crossings over the watercourses. This does not mean the provision of bridges, which would be a costly item in view of the heavy floods which occur in most of the creeks and rivers. During the wet season, there is little movement of wheeled vehicles of any sort in the northern portion of the Territory, and in the dry season the rivers have in most cases but little water in them. But it is just the crossing of these dry watercourses that presents serious obstacles to motor vehicles. This difficulty could to a considerable extent be overcome by laying reinforced concrete paving tracks in the beds of the creeks at crossing places. This could be done in such a manner that they would not be washed away in flood-time, and would provide a solid bottom on which motors could travel in the dry season.

Committee's Recommendations.

20. The evidence tendered to the Committtee showed unmistakably the advantage of fuel oil over coal for many purposes, and the saving that could be effected in freight, handling charges, lack of deterioration, greater efficiency, reduction in number of stokers, &c. The influence on the development of the Territory if a free use be made of motor vehicles was also stressed. The matter was, however, mainly dealt with in the abstract, and the Committee was unable to obtain definite information as to the number of users and the probable quantity of fuel oil and petrol required per annum.

21. Those most likely to benefit by having available a supply of fuel oil would appear to be the Navy, the Darwin Meat Works, and the Railway Department. But it would not be politic to establish at Darwin an adequate supply of fuel oil for Naval purposes unless some steps were taken to enable it to be defended in case of war. The Darwin Meat Works are not now in operation, and no information is available as to when they will re-open, or how long after that it would take to convert their machinery to oil-burning and what quantity of oil fuel they would guarantee to take per annum. In regard to the Railways also, some time would necessarily elapse before their locomotives could be converted to oil-burning, and the Commissioner stated he would require only about 240 tons a year, so that the establishment of a depôt for railway purposes alone could not be considered.

22. In like manner, the possibility of rapid increase in the number of motor vehicles in the territory was purely a matter of conjecture.

23. Under the circumstances, the Committee, although impressed with the possibilities that might eventuate from the establishment of an oil depôt at Darwin, refrains from definitely recommending that such action be taken at the present time. It considers, however, that it is a matter intimately connected with any definite policy adopted for the development of the Northern Territory, and as such might be left to the Minister in charge.

24. After giving the matter close attention, the Committee therefore contents itself with the recommendation that the suggestion to establish depôts at Darwin for the storage of petrol and fuel oil receive the favorable consideration of the Government.

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

Mr. Gregory moved :—

That the proposal to establish depôts at Darwin for the storage of petrol and oil fuel receive the favorable consideration of the Government.

Seconded by Senator Reid.

Mr. Blakeley moved as an amendment :—

That while recognizing the part that oil fuel and petrol will play in the development of the Northern Territory, the Committee cannot approve the scheme put forward by Sir William Clarkson, but realizing the need for sympathetic treatment of the settlers of the Northern Territory, it is of opinion that substantial reductions should be made in rail freight charges on oil fuel and petrol.

Seconded by Mr. Mackay.

The Committee divided on the amendment :—

Ayes (2).	Noes (6).
Mr. Blakeley.	Senator Lynch.
Mr. Mackay.	Senator Reid.
	Mr. Cook.
	Mr. Gregory.
	Mr. Jackson.
	Mr. Mathews.

And so it passed in the negative.

Senator Lynch moved as an amendment :—

That the Committee approve of the establishment of an instalment of an oil depôt for the storage at Darwin of petrol and oil fuel as outlined by Sir William Clarkson to supply the regular needs of the Government as well as for general consumption.

Seconded by Mr. Jackson.

The Committee divided on the amendment :—

Ayes (3).	Noes (5).
Senator Lynch.	Senator Reid.
Mr. Jackson.	Mr. Blakeley.
Mr. Mathews.	Mr. Cook.
	Mr. Gregory.
	Mr. Mackay.

And so it passed in the negative.

The original motion was then put. The Committee divided :—

Ayes (7).	No (1).
Senator Lynch.	Mr. Blakeley.
Senator Reid.	
Mr. Cook.	
Mr. Gregory.	
Mr. Jackson.	
Mr. Mackay.	
Mr. Mathews.	

And so it was resolved in the affirmative.

H. GREGORY,
Chairman.

Office of the Parliamentary Standing Committee on Public Works,
Federal Parliament House, Melbourne,
10th May, 1924.

MINUTES OF EVIDENCE.

(*Taken at Melbourne.*)

MONDAY, 13TH AUGUST, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes.	Mr. Jackson
Senator Lynch.	Mr. Mackay
Senator Reid	Mr. Mathews.
Mr. Cook	

Engineer Vice-Admiral Sir William Clarkson, sworn and examined.

1. *To the Chairman.*—I was in Darwin for about five weeks, and I found that in order to form an opinion upon the question of harbor development I had to study the whole economic position of the Territory. It would be useless to recommend a heavy expenditure at Darwin if the economic outlook would not justify it. The one railway in the Territory runs from Darwin, a costly and inconvenient port, and ends at the Katherine River, which it does not cross. The crossing is difficult for four or five months of the year. Between Katherine and Darwin there are practically no roads. The railway was built for the development of the Territory, but its influence in that way appears to have been almost negligible, due largely to the fact that it is almost inaccessible. It is very difficult and costly to get material to and from the railway, and the line might as well run through a continuous tunnel for all the good it is to the country. In order to justify expenditure on the port of Darwin I had to consider whether anything could be done to improve the transport to and from the railway. The first consideration was whether motor transport could be made practicable. I found that petrol was costing 4s. 6d. a gallon in Darwin. It was imported from the South in tins and cases. This cargo has to be carried on deck, usually on the foredeck, where it is exposed to salt water spray. The tins rapidly deteriorate, and there is a considerable loss of petrol through leakage. I saw cases handled mercilessly, being simply thrown from the ship's slings into a truck, from the truck into the sorting shed, and from the shed into the trucks, and it was a matter of wonder to me that any petrol ever reached the head of the line. I reckoned that, including leakage and damage, petrol would cost from 8s. to 10s. per gallon at the head of the line, but since I left Darwin I have heard that the cost has been reduced considerably. The British Imperial Oil Company has appointed its own agents at Darwin, and is selling petrol there at 2s. 9d. per gallon, so that the figures contained in my report to the Minister for Home and Territories are now not correct. But even 2s. 9d. in Darwin, plus railway freight, leakage, and loss, is prohibitive for motor transport. I therefore came to the conclusion that it was necessary to provide a cheaper method of getting petrol to Darwin, and I prepared a scheme for the erection of two tanks at Darwin as a nucleus, to be added to if the demand for petrol increases. However, the problem of motor transport from the railway to the stations and mines will not be solved merely by the provision of cheaper petrol. Some expenditure is necessary in clearing the tracks and making the creeks crossable. I cannot estimate what this expenditure will be, but it cannot be very great, because for six to eight months in the year the use of motor vehicles is possible without made roads. All that is required is that the smaller ant hills, which are built up very quickly, shall be cleared from the tracks. After the rains the high grass hides these obstructions, and the motorist endeavouring to get through the country does not know of the danger till his car hits one and breaks an axle. The ant hills are fairly solid, but after a direct track had been surveyed they could be cleared easily and inexpensively by the use of a caterpillar tractor, with a plough in front and some implement behind to spread the material that had been broken down. The soil in ant hills is excellent road material. Such a road would be quite sufficient for motor transport for from six to eight months in the year. For the remainder of the year motor traffic would be impossible unless heavy expenditure were incurred in building metal roads; but the residents told me that they do not want to travel in the wet season, no matter how good the roads may be made. On a trip along the railway I saw some of the creek crossings, and I am convinced that the expenditure required to make these fordable would be very small. Therefore I came to the conclusion that if the port of Darwin were made less expensive to work, cheaper petrol were provided, and roads and creek crossings were attended to, transport would be made cheaper, and one of the greatest obstacles to the development of the Territory would be removed. The only reason why the Territory has not gone ahead is the excessive cost of transport, with consequent high cost of living and high wages. It seems to me ridiculous to apply the same Customs duties to imports as are applied to the ports of the southern States. Customs duties are intended to provide revenue and to encourage local industries. It is not to be expected that industries which require Tariff protection will develop in the Northern Territory for very many years. Therefore the Tariff is useless to the Territory as a protective measure. So far as its revenue-producing purpose is concerned, the Commonwealth is collecting duties, but is not providing in return the facilities that are given in other parts of the Commonwealth. I do not think that any telegraph line has been built since the overland line was carried through, and the police service is almost negligible. The residents are subjected to endless disabilities on account of their remoteness from the source of their supplies. Freight on general cargo from southern ports to Darwin is 70s. per ton. That in itself is a considerable handicap without the addition of duties. The freight was 75s. in June last, but I understand that the new contract reduces it by 5s.

2. *To Mr. Mathews.*—The duties affect the development of the Territory by making machinery and all station supplies, food and clothing more expensive. I would like to see Darwin made a free port in respect to all commodities except intoxicants, and I think the duty on them should be doubled. Of course, it may be said that the Constitution does not permit of differential treatment of States; but the Northern Territory is not a State, and according to the interpretation of the Navigation Act it is not even a part of the Commonwealth. If Darwin were made a free port the Territory would go ahead by leaps and bounds, and there would be every justification for spending more money on wharfage facilities.

3. *To the Chairman.*—The best way to make the creeks crossable would be to lay reinforced concrete paving in the bed. It would not be washed away in flood time, and would provide a solid bottom on which motors could travel at all seasons of the year. At pre-

sent, even when the water is not sufficiently high to prevent motors crossing the creek, the debris and mud brought down by the floods block all traffic. If the beds of the creeks were lined with boulders it would be cheaper than concrete paving, but would be less satisfactory. Water lies in these creeks for about four months in the year. The levelled tracks that I am suggesting for the benefit of motor traffic should radiate east and west from the railway. At the present time the conditions are so bad that even if sovereigns were scattered over the country it would not pay anybody to pick them up. There are some districts that are known to be enormously rich in minerals. At Pine Creek men are washing stream tin and making £7 or £8 per week, in spite of the difficulties of transport. There is another good mineral find at the Katherine River. These places cannot be developed because the cost of transporting supplies and machinery is prohibitive. A railway alone will not develop the Territory; it must be made accessible. At the present time the transport to and from the railway is by means of donkeys, camels, and bullock waggons. A lot of money has been spent in putting down bores for water, but most of the bores are on the main track. The ant hills are built up every year, but if the tractor went over the track once a season that would be sufficient.

(Taken at Melbourne.)

TUESDAY, 14TH AUGUST, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Cook
Senator Lynch	Mr. Jackson
Senator Reid	Mr. Mackay
Mr Blakeley	Mr. Mathews.

Engineer Vice-Admiral Sir William Clarkson, recalled and further examined.

4. *To the Chairman.*—I propose to have the oil tanks constructed of steel. Provision will be made for 5,000 tons of fuel oil and 800 tons of petrol. That is a minimum quantity and is governed by the capacity of the ships which are likely to bring the oil down. It would not pay to bring a ship down from Balik Pappen half empty. There are plenty of ships to be obtained with a deadweight capacity of 6,000 tons to 7,000 tons. They would bring one tank with 800 tons of petrol and the remaining tanks with 5,000 tons of fuel oil. I think those quantities would be ample. I do not want to store a greater quantity and have to pay interest on the cost of the oil It would be foolish not to use fuel oil in connexion with the railway system. The Darwin Meat Works also could be run on fuel oil with very great economy The railways, since 1917, have been running on cheap coal I was really responsible for that. The railways purchased, in 1917, 6,000 tons of coal. They approached me in regard to freight, and I sent the coal up in one of the detained German steamers at a freight of about 30s. per ton. That coal is just finished. By getting the freight so cheaply the coal was landed at a cost of 50s. per ton. It could not be obtained at that price to-day. The Meat Works recently paid £8 per ton, delivered at their works. The cost of coal to the railways at present would be in the neighbourhood of £5 per ton. I feel certain that fuel oil could be delivered from Balik Pappen for about £3 per ton. There would be no difficulty in converting the locomotives to enable the boilers to burn fuel oil. Of course, they would still have to keep two men on the engines, but economy would be effected by the fact that 1 ton of fuel oil has a heating value equivalent to 1½ tons of coal. The Darwin Meat Works would effect a huge economy, because they could carry on with a much smaller number of stokers; it would only be a matter of turning a tap—there would be no shovelling to do. I have seen Mr. Bell, Commissioner of Commonwealth Railways, and have placed the whole position before him. Before I sent in my report I told him its nature. He and other Commonwealth railway officials had no criticism to make regarding it. Another great point is that fuel oil does not deteriorate by being kept, while coal does in that climate. Diesel engines are being constructed at present to burn the ordinary fuel oil. Up to the present they have been getting a little better quality than the ordinary fuel oil. The Navy obtained fuel oil from Balik Pappen for 50s. per ton and brought it down in their own tank steamer. The Government has a tank steamer available to bring it down. The freight on tank steamers is not greater than with other steamers. They used to pay higher wages, which the men demanded because they were carrying oil, but now the same rates are being paid. The oil is run into the holds and pumped out. I would allow 10s. a ton for freight from Balik Pappen to Darwin. That probably would be an excessive cost, but I have based my estimates in all these matters on the high side. If the Anglo-Persian Oil Co. or the British-Imperial Oil Co. will not bring the oil to Darwin on their own account, I should say the Government ought to do it. I should prefer an outside organization to do this work. I doubt whether those companies would supply the tanks. I think that is a matter of port improvement more than anything else. No pump will be required on the wharf; the ship will pump the oil into the tank. I have made provision for a pipe line, which will run mostly on the flat. I propose that the railway should provide tank waggons into which the oil will run by gravitation. There are one or two points about which I would like to speak in regard to the cost of petrol. As I said yesterday, the prices which I gave in my report are not now correct; they have been lowered. I have seen the invoices showing the cost at Darwin to be 4s. 6d. Now it has come down to about 2s. 9d. Possibly the Committee will be informed in Darwin that they can obtain it from Singapore at a cheaper rate. There is a "snag" in that. They have received a little from Singapore, but the quantity they can get is very limited, owing to the action of the Dutch authorities. The boats calling at Darwin, coming from Singapore, also call at Dutch ports. The Dutch authorities treat petrol as an explosive, and allow only a limited quantity to enter their ports. If a ship arrives with more than a certain quantity on board it is compelled to discharge it into a lighter when entering the port and to pick it up when it is going out. That makes the cost almost prohibitive. The quantity of petrol that will be brought from Singapore will be insignificant. The present supplies are obtained through Sydney. The oil is taken in bulk from Balik Pappen to Sydney, pumped into tanks in Sydney, from the tanks put into tins and cases, and taken back to Darwin. The petrol thus travels an unnecessary 5,000 miles. Balik Pappen is only four and a half days from Darwin. If a tank is provided and the oil is brought down in bulk the cost must be very materially reduced, even taking into account the cost of building tank waggons and running them. The freight from Darwin to Pine Creek, and possibly to Katherine River, will be 5s. per case—about 8d. per gallon. If you run your tank waggon at 2d. a gallon at the outside there will be a handsome profit for the railway, which will provide interest on the cost and the maintainence of the waggons. So that, when I say that the cost at the head of the line should not exceed from 1s. 6d. to 2s., I feel perfectly certain that I am overstating the case and that the cost ought to be a good deal less. The tanks will be part of the accessories of the wharf.

5. *To Mr. Mathews.*—It would be better to duplicate the tank accommodation, but it will be possible to scratch along with that which I have provided. If you have a Government tank steamer it could be made to wait until the supplies are nearly exhausted. I do not want to load this scheme too highly. The cost of the two tanks, with the pipe line, will be £12,000. A fuel oil tank of steel will weigh about 140 tons. I reckoned that at £45 a ton. The same work has been done in Melbourne for about £30 a ton. That tank will cost £6,300. The petrol tank will cost about £1,900, the foundations about £1,500, and the pipe line about £2,300.

6. *To Mr. Jackson.*—It will be easy to pump the oil from the boats to the tanks. Oil is being pumped a far greater distance than that at Port Melbourne.

7. *To Senator Lynch.*—Gunfire will not reach the tanks in the location decided upon. Eventually, of course, some defensive preparations will be necessary. The hill will have to be excavated to allow the full number of tanks shown on the plan to be installed.

(Taken at Melbourne.)

MONDAY 20TH AUGUST, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Mackay
Senator Reid	Mr. Mathews.

Norris Garrett Bell, M. Inst., C.E., Commonwealth Railways Commissioner, sworn and examined.

8. *To the Chairman.*—I understand that Admiral Clarkson has suggested the establishment of petrol and crude oil tanks at Port Darwin. I think it would be a great advantage to have crude oil if we could rely upon obtaining it at its present price. The coal we are at present using cost 53s. per ton, and if we could obtain fuel oil at 60s. per ton it would be equal to coal at 40s. per ton. It is very unlikely that coal could be landed at Darwin at that price. Coal has not been received from Newcastle for a considerable time, as one large shipment has kept us going for several years. I do not think we could obtain supplies of oil at less than 60s. per ton, and at present rates it would cost at least 90s. per ton to land coal at Darwin. I have been into the question of the cost involved in altering the locomotives to burn oil, and constructing tanks alongside the line. The cost would not be very great, and the use of fuel oil would be economical if we could obtain it at 60s. per ton. If Vestey Brothers were operating, and the Naval Department was prepared to make Darwin an oil depôt, it would, perhaps, be worth while incurring the expenditure. I do not think that oil vessels would call at Darwin to leave the small quantity required by the Railway Department. No petrol-driven engine has yet been designed of sufficient strength to pull a railway train. I am rather inclined to favour a steam-driven coach of the Sentinel type. Railway motors have been tried all over Australia for a number of years, but the engineers agree that they are still in the experimental stage. The cost of maintenance is considerable. At present, I have no motor mechanic in Darwin, and to employ a motor mechanic to maintain and drive a petrol-driven car, which might run once a fortnight, would not be economical. Moreover, it would be risky in running such a car between Darwin and Emungalan, a distance of 400 miles there and back, with no means of repairing it on the way. An engine of the Sentinel type could be driven by one of our own men, and repaired in our own workshops. Petrol-driven cars are used for the gangers, but they are easily kept in order. From a railway point of view the establishment of oil tanks is unjustified. If rice or cotton growing were to be extensively undertaken, and valuable mineral discoveries were made, the construction of tracks east and west of the existing line would be justified, but any cost so incurred should not be debited to the Railway Department.

(Taken at Perth.)

FRIDAY, 14TH SEPTEMBER, 1923

(SECTIONAL COMMITTEE.)

Present:

Senator LYNCH, in the chair;

Senator Reid	Mr. Cook.
Mr. Blakeley	

Leslie Jameson McGhie, General Manager of Meat Works, Wyndham, sworn and examined.

9. *To Senator Lynch.*—Oil fuel has an enormous advantage over coal. At Wyndham we raise steam with oil fuel and also use Diesel engines for refrigeration. We would not think of using coal while we can get oil. We landed 1,500 tons last week, at a cost of about £4 5s. per ton. We are able to use either coal or fuel oil. There is, at the works, storage capacity for 4,000 tons of crude oil. It is pumped by the ship into tanks, which are about a quarter of a mile from the ship's side. From the meat export point of view the establishment of a crude oil depôt at Darwin is desirable. Ships also would be able to replenish their oil supplies. There are parts of the country inland where motor transport could be developed by provision of cheaper petrol supplies.

(Taken at Port Hedland.)

MONDAY, 24TH SEPTEMBER, 1923.

(SECTIONAL COMMITTEE.)

Present:

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook.

John Paterson Lennox Brown, officer in charge of Port Hedland-Marble Bar railway, sworn and examined.

10. *To the Chairman.*—I have not had any experience of the use of crude oil for locomotive purposes. Some investigations of this matter were made by the Chief Traffic Manager and the Chief Mechanical Engineer, and the papers were sent to me for comment. We use on the Port Hedland-Marble Bar railway Newcastle coal, the average price of which, landed here on consignment from Fremantle, is £5 6s. 10d. per ton. I question whether it would pay to get coal from Newcastle direct unless there was a through boat, our consumption having been only 411.65 tons in the last three years. The estimated saving by using oil fuel instead of coal is £33 per annum. Oil equivalent to the coal we consumed during the three years would cost, at £4 15s., a total of £1,528 3s. 11d. Freights on this coast are excessive. Newcastle coal landed at Fremantle costs only £2 1s. 6d. per ton, but handling into and out of Fre-

mantle and at Port Hedland, plus the steamer's freight of £2 10s. per ton, increases the total cost, landed here, to £5 6s. 10d. Locomotive repairs on the line I control are costly I employ one engine-driver who is not a fitter, therefore, any fitting work has to be done by a man sent up from Midland Junction workshops. We have to pay him wages, plus travelling and district allowances, so that he receives about three times as much as his regular wage. A very interesting article on the use of oil fuel for locomotive purposes was published in *The Railway Engineer*, of July, 1921, under the name of Mr A. N. Bell, of the Great Indian Peninsular Railway. Oil fuel develops a greater heat than does coal, and burns out the tubes and stanchions of the boiler Mr. Bell proves conclusively that brass tubes are quickly burnt out, and therefore locomotives converted from coal to oil need an excessive amount of care That they cannot get here. If anything goes wrong with the engine, the driver cannot do expert fitting work, especially as he has always hitherto used coal Therefore it would be more often necessary to bring up a fitter from the south. Moreover, the oil fuel supply should be adjacent to the engine shed and the water supply. My engine shed and workshops are one and a half miles from the head of this jetty, and the oil would have to be either handled in cylinders and gravitated into the engine, or pumped one and a half miles. A locomotive burning oil would require more water than does one burning coal, and there is no water supply at Port Hedland suitable for engines. I sell water to the townspeople for 3s. per 100 gallons. Cartage costs 2s. per 100 gallons, so that the people have to pay 5s. per 100 gallons for water for drinking and washing purposes when they have no water in their tanks. For the engines we carry water from a place twenty miles out of Port Hedland, and store it. If I were using oil fuel, which generates heat quicker and leads to a waste of steam, I would have greater labour and cost in the cartage of water. For these various reasons it would be unwise to adopt oil fuel on the Port Hedland-Marble Bar railway. If the railway were larger and connected big centres, it would probably pay to substitute oil for coal, because we could erect a high gravitation tank and have a 3-inch pipe running into the locomotive sheds. The water supply is an important consideration, because we are dependent upon the supplies at Pundano, Shaw River and Egimbah We do not use the Marble Bar water, because it contains too much magnesia. When the other two supplies have given out we have had to supply Port Hedland with water from Egimbah, ninety-five miles distant Crude petroleum generates a highly inflammable gas, especially in a dry heat such as we experience at Hedland, and if anything should ignite the gas in the tank, the fuel supply would disappear. Sometimes it takes six months to get certain requirements from the south. If I telegraphed to Perth that an engine had gone wrong, a man might be sent up by aeroplane, but meanwhile the whole of the inland traffic must be held up. When the Singapore naval base is established it may be possible to get fuel supplies from there cheaper than from the eastern States. I have made an arrangement with the Airways Company to keep my motor trolley in repair, and they supply me with petrol at cost price, a concession which other people have sought but which the company is not able to give If a big depôt for petrol and crude oil were established at Darwin, other ports along the north-west coast could draw their supplies from that source and keep them in bulk tanks. That would help to develop the interior All the pastoralists are adopting machinery, and much oil-driven machinery is being put on the mines If bulk supplies were established along the coast those people could bring their own drums to the ports to be replenished. But I do not think that petrol-driven engines would draw the loads on the railway As far as Egimbah motor engines would do the work, but beyond there are curves of nine chains radius, and grades of 1 in 45. With a load of 114 to 180 tons, in addition to the water supply, petrol engines could not handle the traffic; but small tanks for the bulk storage of petrol and crude oil to supply the requirements of private people would pay handsomely.

11. *To Senator Lynch.*—I have never seen very big internal combustion engines used on railways, but if they are no better for haulage than are my motor lorries they are useless. The "Groper" engine will not pick up a heavy load from a standing start. It is all right if it has not a heavy load to draw, but it is not capable of drawing a train of twenty-two trucks up steep grades. That work seems to require a heavy engine, and I use the class G engine. The Department is operating a lot of motor passenger coaches on the southern lines, but the internal combustion engine is no good for heavy haulage purposes.

(*Taken at Wyndham.*)

SUNDAY, 30TH SEPTEMBER, 1923.

(SECTIONAL COMMITTEE.)

Present:

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook.

Frederick Alfred James Fowle, Works Manager, Wyndham Meat Works, sworn and examined.

12. *To the Chairman.*—Bulk supplies of crude oil and petrol at ports along the coast would be of advantage to industry if the demand for them existed. At the works we have storage capacity for approximately 4,000 tons of crude oil, but nobody else in the district uses it. Our consumption is about sixty-five tons per week during the season of twenty-six weeks. Last season, with a smaller kill, we used 1,160 tons of oil. The landed cost of the last consignment was 75s. per ton. Other consignments have cost 87s. 6d., and even 90s. 10d. The oil comes from Borneo and adjacent islands. I cannot see that bulk supplies of crude oil at Darwin would benefit any one but Vestey's. Undoubtedly, if storage were provided and one steamer travelled round the coast delivering supplies to the various depôts, economy would result. Our storage is far in excess of our needs, and I am inclined to think that the excess is for Admiralty uses in emergencies. Oil can be used for railway purposes, but I have never learned why locomotives which were converted to oil fuel during a strike reverted to coal when the strike was over. I am seriously considering the conversion of our engine to oil fuel. As a means of refrigeration, generating power, and firing boilers in a place like Wyndham, its value is beyond question. Coal landed here would cost between £5 and £6 per ton. Coal by direct charter costs about £5 10s. per ton. We use twice as much coal as oil fuel for generating steam alone. Careful tests have shown that we use twice as much coal by weight as we use oil fuel to do the same amount of work. Including duty, our last purchase of oil will cost about £4 per ton. The costs I have mentioned do not include the wages of three trimmers per day, one on each watch. For every thirteen tons of coal we would be weighted with an additional £3 for trimming.

13. *To Mr. Blakeley.*—I have heard of danger from the gases given off by petrol in tanks, but not from crude oil. Our tanks have an outlet for any accumulated gases. I saw on the top of one of the petrol tanks belonging to the Imperial Oil Company, at Newport, a valve that allows the vapour to escape, and the rising vapour could be seen by the naked eye. We have had no trouble at Wyndham with either seepage or evaporation. The tanks are constructed of boiler plate.

(*Taken at Sea.*)

TUESDAY, 2ND OCTOBER, 1923.

(SECTIONAL COMMITTEE.)

Present:

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook.

Captain William Scott Wyles, master of s.s. *Bambra*, sworn and examined.

14. *To the Chairman.*—I favour the project for establishing along the coast depôts for bulk supplies of crude oil. That fuel will replace coal more and more as the years go by. On this coast coal is very costly, and oil fuel will obviate the heavy cost of handling coal. I was at one time first mate on the *Kangaroo*, which used 4½ to 4¾ tons of oil per day, and employed three firemen. The *Bambra* employs eighteen firemen and uses 40 tons of coal per day. The following comparative figures were supplied to me at the office of the State Steam-ships:—

	Steaming miles.	Fuel.	Cost.
Bambra ...	49,000	10,000 tons coal	£26,000
Kangaroo ...	43,000	1,550 tons oil	£5,800

The *Kangaroo* is 1,100 tons larger than the *Bambra*.

15. *To Senator Lynch.*—Depôts are not as necessary for oil as for coal. A vessel with Diesel engines can carry enough oil to last her for a very long time. The *Kangaroo* generally stows five or six months' supply in her ordinary bunkers. In eight hours she will take in enough oil for twelve months' steaming. The Danish oil-burning boats that visit Australia always carry a six months' supply of oil. The space formerly used for ballast is now used for carrying oil, and the result is that the vessel's cargo capacity is increased. There is no immediate demand for oil fuel at Darwin, but I believe that when Vestey's re-open their works they will substitute oil for coal. Their experience of coal has been very discouraging. Not only is it costly, but it deteriorates quickly in the north. The *Kangaroo* steams only nine knots per hour, but she can maintain that speed consistently, whereas a vessel burning coal loses speed every time the furnaces are cleaned.

(*Taken at Darwin.*)

FRIDAY, 5TH OCTOBER, 1923.

(SECTIONAL COMMITTEE.)

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook.

Percy Kelsey, managing partner of A. E. Jolly & Co., sworn and examined.

16. *To the Chairman.*—There is not much demand in Darwin for crude oil, but petrol is always in demand. The British Imperial Oil Company is now selling petrol in Darwin at the same price as in Sydney. In consequence the sales have increased. My opinion is that motor traction will be of great advantage in the Territory. If petrol could be supplied in bulk there would be a big demand for it. If a man could obtain a fifty-gallon drum of petrol instead of having to buy in eight-gallon cases, he could get his supplies very much cheaper. That would be a distinct advantage to the man out back.

(*Taken at Darwin.*)

SUNDAY, 7TH OCTOBER, 1923.

(SECTIONAL COMMITTEE.)

Present:

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook.

Charles William Davy Conacher, Managing Director of the North Australian Meat Company Limited, and the Northern Agency Limited, sworn and examined.

17. *To the Chairman.*—If bulk supplies of crude oil were established at Darwin, Vestey's works would use oil fuel, because it would be much more economical than coal I have been told that crude oil is used on the railways in Java, and that travel on the lines on which oil-burning locomotives are employed is noticeably cleaner than on either lines where coal fuel is used.

(*Taken on s.s. "Montoro" at sea.*)

MONDAY, 15TH OCTOBER, 1923.

(SECTIONAL COMMITTEE.)

Present.

Mr. GREGORY, Chairman;

Senator Lynch	Mr. Blakeley
Senator Reid	Mr. Cook

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

18. *To the Chairman.*—I do not think that for many years to come the Territory would derive much advantage from the establishment of bulk supplies of crude oil and petrol at Darwin, or the making of special roads and concrete tracks in the river beds for the conveyance of motor traffic. Roads are necessary to the development of the Territory, but the natural ground should be utilized as much as possible. A peculiarity of the Territory is that the natural surface is in many places extremely good for both motor and dray traffic. In isolated sections road making is very much required, and to those sections attention should be paid. I know of no rivers in the Territory where concrete tracks in the bed of the water-course would be effective, and bridges, if built, would not warrant their cost until a greater population exists.

(*Taken at Melbourne.*)

TUESDAY, 30TH OCTOBER, 1923.

PRESENT:

Mr. GREGORY, Chairman,

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Cook
Senator Reid	Mr. Mathews.

The Right Honorable George Foster Pearce, Minister for Home and Territories, sworn and examined.

19. *To Mr. Mathews.*—On my recent visit to the Northern Territory I was informed that if the people could obtain cheap petrol they would adopt motor transport. So far as crude oil is concerned Vestey Brothers would be the largest consumers. They informed me that they would use crude oil for their pump engines. In one case I was told that it cost

£12 a week for wages, wood, &c., for each bore because of the heavy cost of carting firewood by horse or donkey team The naval authorities, I believe, have strongly recommended that there should be a crude oil supply in the Northern Territory for naval purposes. The next generation will, I think, see oil used for ships to a far greater extent than in the past.

20 *To Senator Lynch.*—At one station there were ten motor vehicles, including two big motor lorries. They told me they were not now using the motors because of the high cost of petrol, but if they could obtain cheap petrol they would utilize them at once. I was informed at the Lake Nash station, where the cost of fuel and wages amounted to £12 a week per bore, they would use crude oil for their engines if they could obtain it at a reasonable cost. The Government believes that if reasonable facilities were provided, private enterprise would introduce a system of motor transport. It is not the intention of the Government to establish State-owned motor services.

(Taken at Melbourne.)

TUESDAY, 30TH OCTOBER, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Cook
Senator Reid	Mr. Mathews.

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

21. *To the Chairman.*—In connexion with action taken to develop the Territory by the running of light trains and with respect to the use of oil for fuel, I may say that I have purchased a Sentinel steam car, built to carry 40 passengers, with a 5-ton trailer. It is fitted with lavatories, and divided into first and second class compartments. We have to divide the classes in the Northern Territory, because many aboriginals and Chinamen travel there. They would go in the second class compartment. Lavatory accommodation is provided, because there is a 200-mile run with little or no conveniences at the stations. Provision is made to carry 30 or 40 passengers, because that number frequently travel on the six-weekly mail special, which the "Sentinel" car will replace. The 5-ton trailer is for mails and luggage. I submit an illustration of this class of car. The motive power is steam, and only a very small quantity of coal is used. I consider this a better type of car for the Northern Territory than the cars now in use in the northern part of Victoria. The latter would not be nearly large enough for a trip like that which has to be made in the Northern Territory. You could not on such a trip and in such a climate crowd passengers up as is done in the Victorian cars. The Sentinel car is in every way a more reliable car. The petrol-driven cars are all right so long as you have an expert driver and mechanic to look after them. If one were used in the Northern Territory it would involve the employment of an expert motor mechanic, whose time would not be fully occupied. It would be difficult to get such a man to go up to the Territory, and as I have said such a car would not be as reliable as the Sentinel car. The estimated cost of this car and trailer is £3,800 landed and in running at Darwin. The manufacturers send the car out with an expert to put it together. It has to be run 5,000 miles before being taken over, and, if we are not satisfied with the result the manufacturers are required to take it back. It could be run whenever required to take passengers from the boats for trips down the line, and any one could hire it who wanted it. With respect to the storage of crude oil in the Territory for development purposes I may say that I could use it in locomotives, but would require only a very small quantity, about 240 tons a year. If Yeatey's and others would join in the erection of the necessary tanks I should be only too glad to take the oil. On our present mileage I would save about £500 a year.

22. *To Senator Lynch.*—I would use it for generating steam.

(Taken at Melbourne.)

WEDNESDAY, 31ST OCTOBER, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Cook
Senator Reid	Mr. Mathews.

Thomas Davis Doyle, Engineer, Victorian Railways Department, sworn and examined.

23. *To the Chairman.*—The Victorian Railways Department commenced to operate about fifteen months ago light-rail motor vehicles driven by petrol. We purchased the ordinary 45 horse-power motor car chassis, less certain parts, and built on to it at Newport a special body and fitted railway wheels. These cars will carry 37 passengers seated, and a maximum of 60 persons standing and seated. In connexion with some cars trailers are used, and their seating capacity varies according to the districts in which they work. Some are capable of carrying 2 tons of goods, in addition to 25 passengers. The cost of the motor vehicle is about £2,800, whilst the trailer costs probably £700. The only type of motor car we have used is the A.E.C., which is built in England, and it is working very satisfactorily. The maximum grade on which these vehicles are operating is 1 in 50, but one car is about to be equipped with different gear in the back axle, so that it may operate on a grade of 1 in 40. The cars have certainly been efficient on grades up to 1 in 50. No difficulty is experienced in starting them when the line is wet or greasy. The drivers are trained by a foreman who was a steam engine-driver with motor experience. No very special qualifications are required for this work except that the driver should know the mechanism of the car in order that he may cope with any difficulties that may arise on the track. So far as I know the Department has not experienced any trouble in getting suitable men. The fact that six more of those cars have been ordered for delivery as quickly as possible is proof that the seven already in operation have been a success. On lines upon which the traffic is small the motor vehicle is certainly a means of saving money. A motor without a trailer is operated by one man. When a trailer is attached there is, in addition to the driver, a guard who collects fares and attends to the goods. No attempt has been made to operate these vehicles with crude oil. We experimented with crude oil for locomotive purposes about 1898, but although it was successful as a fuel it was more expensive at that time than coal. We have not made any recent experiments, but we know that extensive tests have been made in Great Britain. I can see no mechanical obstacles to the utilization of petrol-driven cars on railways in the Northern Territory. It might be difficult to get an ordinary commercial car that would be adaptable to the 3-ft. 6-in. gauge, because the frame of the chassis is about that width. It would be necessary to have new rear and front axles, but the steel underframe might not be

adaptable to the narrower gauge. The Queensland Railway Department has altered Studebaker cars for use on railways of 3-ft. 6-in. gauge, but I cannot say what carrying capacity those vehicles have. I do not know of steam-driven motor cars being utilized on any railway system in the world.

24. *To Senator Reid.*—The small motor cars which have been converted for use on the Queensland railways have engines of about 20 horse-power. The Victorian Railways Department uses for inspection purposes a small car made by Drewry, of England. The engine is 20 horse-power. This vehicle will carry about six persons; it is not used in conjunction with a trailer. Our heavy cars with a trailer attached travel about 8 or 9 miles to the gallon. I should say that the consumption on smaller cars, such as would be used in the Territory, would be about a gallon to every 12 miles. It is questionable whether it would be an economical proposition to install a petrol depôt at the head of the line. Probably it would be cheaper to have one depôt at Darwin, and for the car to start with enough petrol for the return trip. In order to stock and replenish a depôt at the head of the line, the petrol would be required to be carried in drums or in a specially designed tank. One of our motor vehicles travels between Merbein and Red Cliffs, a distance of about 16 miles. The longest run is from Ouyen to Pinnaroo, a distance of 85 miles. The regulation maximum speed is 35 miles per hour. Such a car should not have any difficulty in doing a 200-mile journey with the usual stoppages. You need not apprehend any greater trouble with a railway motor vehicle than with the ordinary motor car. Rather than endeavour to adapt the ordinary commercial chassis to the 3-ft. 6-in. gauge it would probably be more economical to have cars built with a special frame.

25. *To Mr. Mathews.*—The late Dr. Diesel started to develop a crude-oil engine for railway purposes, but nothing of the kind is yet in commercial use. I do not know of crude oil in use anywhere for a direct drive; it is used only for firing engines. Crude oil would be cheaper than petrol, but not necessarily more powerful. The power would be governed by the design of the engine. Some industrial engines used for shunting about factories are driven by crude oil.

26. *To Senator Lynch.*—The rail motor vehicles were introduced by the Victorian Railways Department because of the demand for a better service in districts where the traffic was rather sparse. The innovation was to meet the convenience of the public rather than the Department, but the cars have had the effect of reducing working expenses; in some districts they are expense-savers, and in others they are revenue-makers. They are certainly helping the railways financially, particularly in the Mildura district. Some of the steam passenger trains will be cut out and motor vehicles will be substituted on branch lines where the traffic is small. It is doubtful whether these vehicles would meet the requirements of traffic in thickly-populated areas, but our experience of them in the outback districts so far is that they give a better service at less expense than steam. The only complaint made by the passengers is that there is too much vibration in the cars; we are endeavouring to correct that defect. The ventilation of the cars could be adapted to the climate of the Northern Territory. So far as I know there is no expectation of crude oil being used in these cars; in fact, it is not used anywhere in high-speed engines.

27. *To Mr. Cook.*—Judging by the satisfactory service given by motor vehicles in the Mildura district I am of opinion that they would serve the purposes of development in the Northern Territory, and be more economical than steam-driven trains.

28. *To the Chairman.*—I should think that a motor vehicle runs more cheaply on rails than on a road. The Victorian insulated cars are very similar in construction to those in use in Queensland. They are made with an outer sheathing of wood, a space packed with sterilized cow hair, then another sheathing of wood, and an inside lining of zinc or galvanized iron. The efficiency of the car depends upon the thickness of the insulation. Provided that a car is well packed there should not be much difference between the efficiency of a big car and a little car, although the greater bulk of the contents in the big car would help to keep the temperature low. The proper way to test the efficiency of a car is to load it, take the temperature, expose the car for a number of hours, and then take the temperature again. It is not customary to pre-cool cars before they are loaded with meat. Ice is placed in butter trucks, but not in meat trucks.

(Taken at Melbourne.)

THURSDAY, 1st NOVEMBER, 1923.

Present:

Mr. GREGORY, Chairman;

Senator Barnes	Mr. Blakeley
Senator Lynch	Mr. Cook
Senator Reid	Mr. Mathews.

Commodore George Francis Hyde, Acting First Naval Member, sworn and examined.

29. *To the Chairman.*—From personal observation of the Darwin Harbor it seems to me that the time taken for loading and discharging cargo is unduly long. The facilities are not such as might be expected. To a small extent only I think the delay is due to the turntable. You ask me whether the establishment at Darwin, of, say, a 5,000-ton tank for crude oil would be of value for naval purposes. It would be of the greatest value considering that in the next few years all ships will be oil-burning. In war time an oil store such as is suggested, would be a great advantage if the quantity were sufficient and adequate protection could be afforded. A 5,000-ton tank would be of very great value in peace time Considering the comparatively unpopulated condition of northern Australia at present, one might say that Darwin is a more desirable site at the moment than other places on the north-west coast, although in time to come other ports on that coast would be of use to the navy if they had oil reserves. So far as the navies of the world are concerned there is no question that there will be no coal in use say ten years hence, and probably within that time 70 per cent. or 80 per cent. of merchant shipping will be using oil, because of its economy, and efficiency. It means a reduction in the number of men in the crew and therefore it cheapens working expenses.

30. *To Senator Reid.*—Any British ships in need of fuel would no doubt be glad to avail themselves of oil reserves at Darwin. Dutch ships might possibly find it convenient to purchase oil there if it were available to them. Oil will carry a vessel, roughly speaking, half as far again as the same weight of coal will A ton of oil will take a ship approximately the same distance as 1½ tons of the best coal, say Welsh coal. When I was with my ship at Singapore and Penang, two and a half years ago, it was cheaper to use oil than Welsh coal, and it was cheaper to use Welsh coal than Newcastle coal, although Singapore is much closer to Newcastle than to South Wales.

31. *To Mr. Mathews.*—I cannot say that I am well acquainted with Stokes Hill, the proposed site for oil tanks. I know the place only from the chart. Of course tanks there would have no chance against an enemy's fire. I have been speaking of oil reserves under peace conditions. One destroyer could under

present conditions blow Darwin sky-high within twenty-four hours of the declaration of war. The proposed tanks would be of use in war time provided they were not attacked.

32. *To Senator Lynch.*—A ship burning coal will certainly be unable to compete in future with one consuming oil, because the weight of the fuel is less, and the engine crew can be reduced by roughly one third. Oil is cleaner to work with and it means less wear and tear on the boilers. The boilers last much longer. There is no manual labour involved in the utilization of oil as against coal. Instead of it taking ten hours to load 2,000 tons of fuel you can take in oil at the rate of 1,000 tons an hour. The only disadvantage that I know of at present in regard to oil is that the world's supply may prove rather less than the demand. We are now awaiting developments in connexion with internal combustion engines. These burn about half as much oil for a given power as is consumed when using oil as an agent for raising steam. The internal combustion engine, however, is in its infancy The Union Steamship Company is now building a vessel of about 20,000 tons, fitted with internal combustion engines and capable of a speed of 17 knots. This ship will require only a few thousand horse-power, whereas a warship may require 150,000 horse power Darwin has been considered as a suitable place for oil stores, but other places for other reasons have also received consideration. Any scheme, however small, for the storage of oil at such places as Port Darwin would undoubtedly be most useful to the navy, because we should immediately ask that a reserve be kept, and that we should be given first call. Taking everything into consideration a vessel burning oil would be 30 per cent. superior as a fighting unit to one burning coal.

33. *To Senator Reid.*—If it so happened that the British warships about to visit Australia were calling at Darwin, they might find an oil reserve there of great value, but according to present arrangements Darwin is not included in their itinerary. In some cases it would be advantageous to take in oil at Darwin, where it should be cheaper than at Sydney, because it would have been carried 2,500 miles less distance.

PUBLIC WORKS COMMITTEE.

(Taken at Sydney.)

TUESDAY, 26TH FEBRUARY, 1924.

Present:

Senator LYNCH, in the chair;

Senator Barnes,	Mr. Cook,
Senator Reid,	Mr. Jackson,
Mr. Blakeley,	Mr. Mackay.

Charles William Davy Conacher, managing director of the North Australian Meats Company Limited and the Northern Australian Agency Limited, recalled and further examined.

31. *To Senator Lynch.*—I have heard of the Government's proposal to establish an oil depôt at Darwin. It is a very good move In the event of oil being provided there, my company would consider the question of converting its boilers for the use of oil instead of coal. We have already obtained estimates for such a conversion Presuming that the oil supplied is fuel oil, and is suitable for our purpose, I could guarantee that the company would convert its machinery. A supply of cheap fuel oil would be very advantageous to road traffic in the Territory. It would, together with improvements in the roads, set aside the teamster. I do not think that any station tributary to Darwin uses motor traction. They may do so on the Barkly Tablelands.

TUESDAY, 4TH MARCH, 1924.

Present:

Senator LYNCH, in the chair;

Senator Reid,	Mr. Mathews.
Mr. Mackay,	

Samuel Clarkson, Manager British Imperial Oil Company, sworn and examined.

35. *To Senator Lynch.*—We have looked into the question of the oil trade at Darwin as a business proposition, and have learned as much as we can about it. We found that the trade is extremely limited, not necessarily by reason of the high prices that obtained there up to June of last year, but the trade is insignificant, I suppose primarily because the country is not developed. I should like to mention that in conformity with the company's policy of controlling prices—and when I say "controlling prices" I mean exercising that control in order that the public may be given a fair deal—we have now established our own agency at Darwin in the firm of Jolly and Company. When we put down our initial supply there, in August or September last, the selling prices of motor spirit dropped from 35s. per case to 22s. 8d. That is a drop of 12s. 4d. per case. Traders there have not since been making the excessive profits which they previously did on motor spirit and kerosene. To-day their profit is 2s. 6d. per case. The volume of trade at Darwin is negligible. Our records show that, for the whole of last year, the motor spirit trade was only 1,250 cases and the kerosene trade somewhere in the vicinity of 2,600 cases. There is really nothing in it. Of course, with the meat works closed down, the place is practically dead. Going back to the time when the meat works were in operation, the price of motor spirit and of kerosene was about double what it is to-day. We have no reliable statistics going back for three or four years. We know what we have done there, but we do not know what other people have done. To-day I think we have practically the whole of the trade, small as it is, simply by reason of the fact that we have taken the market and given the people a fair deal by selling at a price from 3s. to 4s. per case below what it would cost to land supplies from Brisbane or Sydney. It is to our interests to see the Northern Territory developed. That is one of the reasons why we stepped in to put an end to the high prices that were being charged. A price of 35s. per case for motor spirit was ridiculous. There is a little liquid fuel, sometimes called crude oil, taken round from Brisbane, but I could not give you any estimate of the trade in liquid fuel. I know there is little or nothing in it. I should say that the high prices ruling for motor spirit and kerosene before our company stepped in, and by its action led to a reduction in those prices, were due to a lack of competition. Such a condition of things is not likely to arise again whilst we control prices with our own agency in Darwin.

36. *To Mr. Mackay.*—Ours is essentially a wholesale trade.

37. *To Senator Lynch.*—We control the retail price. Jolly and Company are ordinary merchants at Darwin, and, as our agents, their profit on our products must not exceed 2s. 6d. per case above the wholesale price. That is what we consider a fair margin of profit. They can make that profit over and above the agency commission we give. Prior to our control of the prices retailers made excessive profits up to 9s. and 10s. per case, and were holding back the industry. I do not say that Jolly and Company did so, but it was being done in Darwin. I have not seen the Northern Territory railway, but, speaking of it as I know it from hearsay, I believe that a petrol engine would be an attractive proposition to the Government. The Commonwealth Railways Department already has some petrol engines. I think they are in use now in practically every one of the States. In Victoria I think there are seven petrol

engines in use on branch lines feeding main lines. Where you have no heavy haulage I think the petrol engine will be found more economical than the ordinary railway locomotive. In Queensland the Railways Department has three or four petrol engines, in New South Wales there are quite a number of them, and the South Australian Government are now having fourteen petrol engines built for locomotive purposes. The prospect of motor spirit displacing horse power for transport purposes in the Northern Territory must depend largely on the formation of the country. I do not know whether it is sandy or very hilly, or whether it is adaptable for motor traffic. There is no doubt that in many directions motor power is supplanting horse power, and I assume that that will occur in the Northern Territory as elsewhere. For agricultural purposes, tractors must sooner or later supplant horses. I should say that motor power is essential for the proper development of the Northern Territory, and it is, of course, also essential that motor fuel should be available at a reasonable figure. Our company is the only company supplying petrol to Darwin to-day, because we put Darwin on such a favorable basis. Our supplies come from Sumatra, and are shipped from Singapore. We have Burns, Philp boats calling at Darwin, and it seemed to us ridiculous that we should bring supplies in bulk to Sydney, can the spirit there, and then freight it all the way back to Darwin, when we might bring it direct to that port. The result was that, in adjusting prices, we arrived at a price which would return to us the same figure at Singapore as we received for the whole of the sales throughout Australia. We thought that would be fair to Darwin, would give the people there a fair deal, and would encourage the port. Assuming that our sales throughout Australia for motor spirit returned at Singapore 10s. per case, we added to that the freight to Darwin, and as a result cut about 3s. 6d. off the price for bringing the supplies back from Brisbane or Sydney to Darwin. We have not asked a penny greater return than we are getting in any other port of Australia, although you will realize that, if we so desired, we could charge up to 3s. per case more than we do at Darwin and still be protected against any exports from the south. The price of motor spirit at Darwin now is 20s. 8d. per case. There has been a drop of 2s. per case since we reduced the price there from 35s. to 22s. 8d. per case. Sumatra is our main field of production, but we get some supplies from Borneo. Borneo supplies largely liquid fuel, whilst Sumatra is the field where the motor spirit is produced. The possibility of the Commonwealth Government obtaining supplies of oil independent of the operations of existing companies in the Dutch East Indies is a matter which could be gone into. We can speak only for Australia. We have no jurisdiction in places outside the Commonwealth. Our company has not exclusive control over the sources of supply in the Dutch East Indies. There are various concerns operating there. I do not see that there would be anything to prevent the Commonwealth Government purchasing supplies from any companies operating there. As between coal and liquid fuel, the ratio of efficiency is three to two. Two tons of liquid fuel will do the work of three tons of coal for the production of steam. Coal can be obtained here at about £2 per ton, while the price of liquid fuel in Melbourne at the present time is 85s. per ton. The efficiency of liquid fuel as compared with coal is, as I have said, two to three, but there are other factors to be considered. There is the abolition of the handling costs of coal, of the cleaning of clinkers, the banking of fires, and the waste of heat in the firing up, &c. All the costs of handling and other expenses I have referred to must be debited against coal in arriving at a comparison of cost in addition to the efficiency value of two to three. There are no such expenses in the use of liquid fuel. There are no difficulties of handling. It is pumped from one place to another; for storage it requires infinitely less space than coal; it is cleaner to handle. As a matter of fact, the operatives do not come in contact with it at all. It is merely a question of turning a tap. In a place like Darwin the use of liquid fuel would be still more advantageous than the use of coal because of the high cost of labour there. Coal has to be brought to Darwin at the present time from the south, and I imagine liquid fuel could hold its own against coal at Darwin on prevailing prices. The labour situation at Darwin has to be taken into account. In my view liquid fuel, petrol, or kerosene, must hold their own against coal at a place like Darwin. In the transport of oil in bulk, one-half per cent. is a fair allowance for waste or leakage. Another point which should be mentioned is that liquid fuel will not deteriorate from keeping for a period of years, whilst coal rapidly deteriorates. Motor spirit will certainly evaporate if it is not properly sealed, but that is not an objection to its use, because it can always be properly sealed There is no particular danger in the storing of petrol in a hot climate like that of Darwin. I have examined on your plan the proposed location of oil tanks at Darwin, and I should say that the site proposed is an ideal one It is handy to the town, and there is deep water up to a place from which the oil could be pumped from vessels into the shore tanks. The element of danger arising from the location of the oil tanks in proximity to the town need give no concern, where proper precautions are taken Our people have big canning works at Fulham-on-the-Thames, seven or eight miles from the centre of London. Those works are established in the midst of a tremendous number of houses, and there has never been an explosion or accident or any trouble at all at the works. The fact that our people take their own insurance is a sufficient indication that there is no great risk. I am not in a position to say whether there would be more or less danger to be feared from the establishment of oil tanks than of a gasometer in proximity to a centre of population. The shore tanks are connected with the discharging jetty by pipe lines of various diameter, according to the nature of the product stored. The material of which the tanks are constructed is fabricated steel plate. It would not require to be of special quality for the storage of oil because oil has only a preservative action upon metal Liquid fuel is used as a preservative by certain large machinery manufacturers. Vaseline is a product of petroleum. When you refer me to quotations for kerosene in England at 11d. and 12d per gallon, as against 1s. 8d. in this country, I think your advices must go back prior to an increase of 4½d per gallon which took place recently in England I do not know to what extent the price of kerosene was advanced, but I assume that it was advanced in sympathy with the advance in the price of motor spirit. You say that the price you have quoted was for January, but the change in the price took place the first week in February. The difference between the price of motor spirit and kerosene in England and in this country is a matter which has been discussed so much that it seems to me a little unnecessary to mention it The trade is conducted very differently in England from the way in which it is conducted in Australia, where the whole of the trade is done in tins and cases These packages cost money. I may inform you that the cost to-day is somewhere about 3s. 6d. for a case and two tins. In the Old Country the trade is done in two-gallon cans, which become the property of the buyer, who obtains his requirements from a base at which the material is kept in bulk. The application of this system to Australia was carefully studied some years ago, but it was found that it would not operate in this country. The reason is that the population here is so scattered that we could not have bulk depôts—for instance, at Ararat, Wangaratta, Benalla, and other small centres. In the Old Country, on the other hand, there are filling stations in almost every town We have installations for bulk delivery in the large capital cities in Australia, but we do not enter into the retail distribution. When you mention that kerosene is quoted in the United

States at from 7 cents to 14 cents per gallon, and petrol in bulk at from 12 to 15 cents per gallon, or 6d., as against 2s 6d in this country, I may say that such quotations are not of much value for purposes of comparison America has recently experienced the effects of considerable over-production of oil and it is not fair to quote for comparison prices ruling in America, which are very largely fictitious. I have private advice that in a little place called Sapulpa, in the United States, motor spirit was selling at 9 cents per gallon in the morning, at 14 cents in the afternoon, and at 12 cents next morning. The people had become panicky. In Australia we get advices of low prices in America for oil, but they are generally confined to some inland field, such as in Oklahoma, where there are oil fields roughly 2,000 miles from any sea-board. Recently, on the Californian coast, the production has been absolutely phenomenal, and those operating in comparatively small central fields have scarcely been able to sell their production at all. They have practically had to give it away. It would cost them more to pipe the stuff across to the sea-board than they could get for it at the sea-board. They could not enter into the export trade at all. They might not be small producers, but the trouble has been that the total production has been so great that there was more than sufficient to go round, and the central fields have been operating at a very serious disadvantage. The lowest price at which motor spirit can be obtained in Australia, buying in bulk, is 15s. 8d. for eight gallons, which works out at 1s. 11½d. per imperial gallon. That is absolute bedrock. I would not favour the establishment by the Commonwealth of an oil and motor spirit bulk dépôt at Darwin for the development of the country. I do not think it would ever pay for itself. I can see no justification for it. It would not pay us, and I could not recommend to you a proposition which we would not take upon ourselves. Unfortunately, the cost of tankage to-day is extremely high. I do not think that a 4,000 ton tank could be built to-day for less than £7,000, and it might possibly cost a good deal more. We have all the necessary information on the subject, and if there is any way in which we can help the Committee by supplying actual figures and estimates, we shall only be too happy to do so. I repeat that I do not think you could build a tank of 4,000 tons capacity—and a smaller one would be uneconomical—for less than £7,000 to-day. That is my estimate of the cost of a tank in Melbourne, and it certainly would not cost less to build such a tank at Darwin. Seven thousand pounds is a conservative estimate for a tank of 4,000 tons capacity, and it might cost up to £11,000. The prospect of the people of Australia obtaining a cheaper oil supply is entirely dependent upon the world's market price. Australia must pay the world's market price just as other countries have to do, and just as we have to pay the world's market price for tin and the world's market price for wool.

38 *To Mr Mathews.*—The world's market price is determined by the United States because they produce about 63 per cent. of the world's supply, and use somewhere about 79 per cent. of the world's production.

39 *To the Chairman.*—We may have to fall back upon the extraction of spirit from petroleum shale if the world's supplies of petrol peter out, but while petrol is available the public generally will not touch industrial alcohol.

40 *To Mr. Mackay.*—I have recommended the use of petrol for engines for Northern Territory railways, but I quite appreciate Mr. Bell's evidence that it would not be suitable for heavy haulage owing to the difficulty of starting the deadweight of a train of twenty odd trucks. For heavy haulage I do not think it is an economical proposition, but for light spasmodic haulage, and for feeding lines over which there is carried no great number of passengers or no great volume of freight it seems to me the ideal fuel. I did not consider the carriage of cattle over the Northern Territory railway, because I assumed that they would be taken on the hoof to Darwin. In view of this, I do not think that petrol engines could be advantageously used instead of ordinary steam engines, but their engines might be converted to liquid fuel burning, as is done in the United States. It would be practicable, and I think economical, to use liquid fuel instead of coal in the existing engines. I should think it would be preferable to use oil instead of coal at the Darwin Meat Works. We have discussed the matter to some extent with those in charge of the Meat Works, but I am afraid that at present they do not quite know what they are going to do. No doubt liquid fuel would be the ideal fuel for their purpose. Its use would have special application to their business, especially in view of the fact that the supply of labor is likely to be a very difficult problem for them. I really cannot see any justification of expenditure upon the erection of tanks for the supply of oil for the Northern Territory. I have explained that the consumption at Darwin is 1,250 cases of petrol and 2,600 cases of kerosene per annum. I am referring, of course, to refined oils; and assuming the consumption increased by 200 per cent. within the next few years, that would be only 12,000 cases, which is a mere bagatelle. Assuming that Vestey Brothers would require 500 tons of liquid fuel a year, that would not justify the building of a 4,000-ton tank at Darwin. We have made provision in some places for the storage of liquid fuel on a very large scale. The Savoy Hotel is heated throughout to-day by liquid fuel. It is found cheaper than coal in the final analysis. It has been found that valuable space can be put to better advantage than for the purpose of storing coal. Electric works have switched from coal to liquid fuel, and so have large number of foundries. We have to-day huge liners, like the *Olympic*, the *Majestic*, and the *Aquitania* running with liquid fuel. Their space is very valuable, and they can use it to better purpose than for the storage of coal. You can realise that they can carry a tremendous quantity of liquid fuel in their double bottoms. Packing is unfortunately a costly business, and the cost of containers adds considerably to the price of petrol in Australia. There is no immediate prospect of the invention of a cheaper container than that now used. I think we have now about the cheapest container that can be used.

41. *To Mr. Mathews.*—In my opinion there would be nothing in the construction of tanks for the storage of oil at Darwin. The trade at Port Melbourne is twenty times greater than the trade at Port Darwin. We did not see why Darwin should be held back, and the people there taxed to the extent of a profit of 3s. or 10s. per case. We are really just entering upon the oil age to-day, and there will no doubt be a greater advance in its use. The Navy Department to-day is buying its supplies at Balik Papan, and at Tarakan, on the east coast of Borneo. It purchases there the whole of its requirements of liquid fuel, and brings it down in its own tank ship, the *Kurumba*, buying the material f.o.b. at those places. I do not see why the Government, if they so desired, should not buy and bring down supplies they require for Darwin. Our principals have interests in both Sumatra and Borneo. We are merely a marketing concern here, and have no connexion with production at all. There may be less need now for Government control of oil at Darwin than there was when the project was first mentioned. The Government had a right to feel very much annoyed at the way in which the trade was being conducted at Darwin, because the people there were not being given a fair deal. When the matter came under our notice, we promptly set about improving the position. The price of motor spirit to-day at Port Darwin is 20s. 8d. per case, which is 2s. 7d. per gallon. At one time it was about 4s. 6d. per gallon.

42. *To Senator Reid.*—I do not claim an intimate knowledge of petrol engines used on railways. I have not examined the types of engines that are being used, but we have had reports submitted. We find that they are using various types and makes of motor, the average I think is a six-cylinder, with 7-inch stroke and 4-inch bore. Our advices are that the use of these engines is highly satisfactory for feeder lines. These lines will not, doubt in time become very important, when these engines will not be able to cope with their trade. The lines will then have to be served by ordinary steam trains. They had some trouble in the nursery stage with the engines, and our engineer has given what help he could in the matter. The difficulty has been found to be due to simple matters easily remedied. The fact that the number used is increasing, and that the South Australian Government, after watching the progress in other States, has decided to use fourteen of these engines, indicates that their use has been found to be very satisfactory. No doubt they are limited in the scope of their work. The ordinary locomotive requires but little alteration to enable liquid fuel to be used instead of coal. It seems to me that the use of liquid fuel in railway engines should help considerably. I should say that before the erection of a tank for the storage of oil in the Northern Territory the consumption should be at least three times the capacity of the tankage. The consumption should be somewhere about 10,000 or 12,000 tons per annum to justify the erection of a 4,000-ton tank. If there were any promise in the proposition at all, our company would have considered its adoption as a matter of ordinary business, but honestly I cannot see anything at all in it. It would be necessary for the trade to develop to about 500,000 units of one product to justify a tank of 4,000 tons capacity. You might say, "Why not build a tank of 800 tons or 400 tons capacity," but our principals are very strong against the erection of a small tank. As a rough estimate I should think that the Darwin Meat Works, if run entirely on liquid fuel, would require about 500 tons per annum. If I knew the quantity of coal they used when the works were in operation, two-thirds of that quantity would be the quantity of oil they would require If you say that they used 10,000 tons of coal, then they would require 7,000 tons of liquid fuel, but I had no idea that they required so much coal. Our supplies for Darwin are obtained from Singapore. It would not pay us to establish storage at Darwin for the supply of passing ships. That would involve sending the ship bringing the oil to Darwin for some distance further with perhaps only half a cargo. Darwin is about eight days from Singapore, while Sydney is about nineteen days from that port. If a ship delivered half her cargo eight days out from port she would be travelling the other eleven days with only half her cargo, and that would be too expensive. It is better to supply Darwin direct. We have sent small cargoes of liquid fuel to the meat works at Wyndham, and recently sent a cargo of 1,500 tons. These cargoes were carried by small boats. In my opinion it would suit the Navy better to go to Singapore than to Darwin to obtain oil, though in case of war the position might be different. As a commercial proposition it would pay the Navy better to go to Singapore for supplies of oil. In any case the freight from Singapore to Darwin would have to be paid if a supply station were established at Darwin.

43. *To Mr. Mackay.*—There is no evaporation of liquid fuel It is a heavy liquid, which flashes at about 175 degrees. It has no volatile fractions at all

44. *To Mr. Mathews.*—I am against the establishment of tanks at Darwin for the storage of oil to meet the consumption in the Northern Territory, including Vestey's and the railways. At the present time it does not appear to me to be a commercial proposition I could not recommend it even as a sporting proposition.

45. *To the Chairman.*—Our parent company is the Asiatic Petroleum Company. I think the Americans have some interests in Sumatra There are many Dutch and other companies operating in the Dutch East Indies, although speaking generally it is a Shell Company's field.

46. *To Senator Reid* —Our parent company has not, to my knowledge, any connexion with the Anglo-Persian Company.

The Committee adjourned

Printed and Published for the GOVERNMENT of the COMMONWEALTH of AUSTRALIA by ALBERT J. MULLETT, Government Printer for the State of Victoria.