

3/11/75

WELL PURCHASE AGREEMENT

PARTIES
AND WELLS

The British Petroleum Co. Ltd., acting for itself has agreed to sell the wells known as Cousland No. 1 to 4 to Oil Exploration (Holdings) Ltd.

CONFIDENTIAL
NATURE OF
PURCHASE

Without impairing the right of The British Petroleum Co. Ltd., and Oil Exploration (Holdings) to exchange or divulge their own data and information to other parties, The British Petroleum Co. Ltd. and Oil Exploration (Holdings) agree to keep confidential and not to exchange or divulge information received under the terms of this agreement to any party not a party to the agreement; provided, however, that either party may divulge such data on the same confidential basis to the Companies in its Group; and, provided further, that either party or any such Company may divulge such data on the same confidential basis to an "Affiliate" or "Affiliated Company" as defined below.

"Affiliate" or "Affiliated Company" shall mean, as to a party to this agreement or as to a Company in either of the aforesaid Groups, as the case may be: (a) a corporation of which the share capital conferring a majority of votes at stockholder's meetings of such corporation is owned directly or indirectly by such party or Company; (b) a corporation which owns directly or indirectly share capital of a party or Company conferring a majority of votes at stockholder's meetings of such a party or Company; or (c) a corporation of which the share capital conferring a majority of votes at stockholder's meetings of such corporation is owned directly or indirectly by a corporation which also owns share capital conferring a majority of votes at stockholder's meetings of such a party or Company.

INFORMATION
TO BE
EXCHANGED

The well data will be factual and not interpretive. One copy of each document is provided.

The following data is included, which comprises all the information on the well:-

- (1) Lithologic Logs for Cousland Nos. 1 to 4 inclusive.
- (2) Completion Reports for Cousland Nos. 1, 2 and 3.
- (3) Lithologic Logs for D'Arcy Borehole and five Shallow Boreholes G1 to G5.

AGREED AND ACCEPTED:

FOR THE BRITISH PETROLEUM CO. LTD.

R. Hawkins

AGREED AND ACCEPTED:

FOR OIL EXPLORATION (HOLDINGS) LIMITED

R. E. Fox

C.I. PTW

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R. E. Fox

C.T. POW

97

Memorandum

From PRODUCTION DEPARTMENT,
GENERAL BRANCH.

To D'ARCY EXPLORATION CO. LTD.
EAKRING.

Our Ref. F&G/65/1218 **Your Ref.**

Date 29th May, 1951.

Subject

COUSLAND WELLS NOS. 1 AND 2.

We thank you for your memorandum dated 11th May giving an estimate of the cost of plugging Cousland wells Nos. 1 and 2 in accordance with the requirements of the Ministry of Fuel and Power. As no allowance was made for this work in your estimates for 1951 we have referred the matter to the Director and Chief Accountant for sanction. We shall advise you in due course of the result of our application.

W. Wooding



WHD/AKD.

Copy

From D. E. C., EAKRING.

To W. H. DOWLING, ESQ.,
FIELDS AND GEOLOGICAL DIVISION.

Our Ref.

Your Ref.

F&G/65/1177

Date

11th May, 1951.

Subject

COUSLAND WELLS NOS. 1 AND 2

As requested in your memo. of 24th April, we now enclose our Drilling Superintendent's estimated time programme, together with his detailed plugging programme for both these wells.

We estimate that the ^{direct} cost of this work will be £1000, made up as under:-

Salaries	£145
Wages	180
Lodging Allowance	85
Stores; cement, shale, water and spares	95
Fuel for Cardwell and tank	60
Lub.	5
Transport to site	25
Hire of equipment	75
Clearing and restoring sites	330
	<hr/>
	£1000
	<hr/>

W. Woodcock.

Memorandum

From DRILLING SUPERINTENDENT,
EAKRING.

To WORKS MANAGER, EAKRING.

Our Ref.

Your Ref.

Date 3rd May, 1951.

Subject COUSLAND WELLS NOS. 1 AND 2

With reference to your instructions re abandonment of Cousland No. 1 and Cousland No. 2, herewith the following programme.

Equipment required

Cardwell and mast; C.100 pump with 8800 Caterpillar engine with 5 $\frac{1}{4}$ " liners in pump; suction tankers to carry water to site for mixing mud and also for cementing.

Running gear for handling 2" tubing and extra tubing for No. 2 well.

Cement (approx. 6 tons for both wells); shale, approx. 5 tons. The cement and shale we may be able to obtain from Scottish Oils.

Cousland No. 1

Men required 1 tool pusher, 1 driller, 4 rigmen.

Time moving material from Eakring to Cousland (2 days).

Rigging up (one day).

Mixing mud (one day).

Pumping and killing well (one day).

Pulling tubing and running open end tubing to near bottom
(one day).

Mix and pump cement to bottom through tubing, followed with mud (one day).

Mix mud during 24 hours waiting for cement to set (one day).

Test cement for hardness; if O.K. fill well with mud; pull out (one day).

*Ob. Cousland No. 1 & 2
Note 1/2/51 - Inds.*

Plugging Programme, Cousland No. 1

Mix mud to say 1.1 S.G., quantity required approx. 600 cu. ft. Pump mud down annular space between 8 $\frac{3}{4}$ " casing and 2" tubing. The reason for not pumping down tubing is because tubing at bottom is perforated with no open end at bottom, also we have no idea regarding condition of tubing in well.

When well has been killed with thin mud (water could be used, but as we have no large supply of water available using water is not advised as well takes water fairly rapidly, but with mud would temporarily seal gas.)

When well killed, pull tubing (keeping hole full all the time) remove perforated joint, run tubing to near bottom 1740', mix 2 tons cement and calcium to 1.8 S.G., pump same to bottom through tubing followed with sufficient mud to land cement from 1740' to 1550'. Pull above cement to 1500', and circulate. Test hardness of cement at 1550' after at least 24 hours with tubing. If cement takes full weight of tubing at 1550' mix viscos mud and fill casing 8 $\frac{3}{4}$ " with same to 50 ft. from surface. Bridge casing at 50 ft. and fill with cement to just below wellhead fittings. When hard remove all fittings, fill cellar with cement to 3 ft. from surface, remove cellar walls and fill with top soil.

Position of Well No. 1

11 $\frac{3}{4}$ " casing at 268' 4".
8 $\frac{3}{4}$ " casing at 2057' 2 $\frac{1}{2}$ ".

Well cemented up to 1740'.

8 $\frac{3}{4}$ " casing perforated at 1720' - 1735'.
" " " " 1623' - 1630'.
" " " " 1582' - 1613'.

2" tubing perforated near bottom.

Cousland No. 2

The same drilling gear to be used as for No. 1 well.

Plugging Programme for No. 2

Run tubing open end to approx. 50 ft. below shoe of $8\frac{3}{4}$ " casing. Mix cement and calcium (2 tons) which will bring cement up to approx. 1808' (150 ft. inside casing). Test hardness after 24 hours. Mix viscos mud and place from 1808' to 50 ft. from surface. Mix cement and calcium and place from 50 ft. to near surface. Remove well fittings. Fill cellar to 3 ft. from surface with cement. Remove cellar walls and fill with top soil.

Position of Cousland No. 2

$11\frac{3}{4}$ " casing 357'
 $8\frac{3}{4}$ " " 1958'
Fish at 2063'.

311 139,200
15 2,700
15,700

a - C. Swell

Memorandum

From MR. W.H. DOWLING
FIELDS & GEOLOGICAL DIVISION **To** MR. W. WOODCOCK, MANAGER,
EAKRING, NOTTS.

Our Ref. F&G/65/1177 **Your Ref.** **Date** 24th April, 1951.

Subject COUSLAND WELLS NOS. 1 AND 2.

Since we have now formally surrendered Prospecting Licence A.118a which covered our operations in the Cousland and Pentland Hills districts, we are required by the Minister of Fuel and Power to carry out certain work on Cousland Wells Nos. 1 and 2 as recommended by Mr. Butlin, the Ministry's inspector of drilling operations, and set out in the Ministry's letter dated 11th December 1950. Copies of the following correspondence are enclosed for your information and guidance:-

Letter from Ministry	dated	11.12.50.
"	"	A.I.O.C. " 19.2.51.
"	"	Ministry " 11.4.51.

Mr. Colvill has been asked to write to you regarding the programme as required by the Ministry; meanwhile, as no allowance was made in your estimates for 1951 for the work involved, please give us an estimate of the cost, which will be possible from the Ministry letter dated 11th December 1950.

Enc.

c.c. Mr. Colvill. (with encs.)
Mr. de Hamel.

COPY.

Ministry of Fuel and Power,
Petroleum Division,
7, Millbank,
London, S.W.1.

Ref: PD 811/17/12

Your Ref: UK/A5

11th December, 1950.

The Secretary,
D'Arcy Exploration Co. Ltd.,
Britannic House,
Finsbury Circus,
E.C.2.

Sir,

PETROLEUM (PRODUCTION) ACT, 1934.

I am directed by the Minister of Fuel and Power to refer to the visit on 15th November of Mr. Butlin, Inspector of drilling operations, to the Cousland bore holes. As a result of his inspection Mr. Butlin has suggested that the following precautions should be taken for Wells Nos. 1 and 2 :-

Well No.1

If this well is to be abandoned a cement plug should be put in with the tubing to cover the bottom of the well and come up inside the 10" casing and after a hardness test, the tubing should be pulled, the well filled and a cement plug placed near the top, the surface connection taken off and the bottom of the cellar filled with cement after which the cellar walls and derrick foundations should be broken down to a depth of 3' below ground level and filled with soil. The whole site should then be levelled off so that the area operated by the well can be handed back in the condition it was taken over.

It is desired to retain the well for observation purposes :-

- (a) All valves should be chained and outlets plugged,
- (b) All fittings cleaned and coated with grease,
- (c) The extension wheel should be taken off the 10" Master Gate Valve,

/.....

(d) A brick shed with an iron door should be built over the well head fittings and provision made so that the extension wheel can be fitted to the 10" gate in an emergency. The door must be securely fastened.

Well No.2

This well should be abandoned and the following programme carried out :-

- (a) The 10" flange should be removed,
- (b) A cement plug placed in the bottom of the well to come up into the 10" casing,
- (c) The 10" casing should be filled up and a cement bridge placed at the top of the 10" casing,
- (d) The bottom of the cellar should be filled with cement,
- (e) The walls of the cellar should be broken down as well as the derrick foundations, to a depth of 3' below ground level,
- (f) The hole should be filled with soil and levelled off so that the area can be handed over in the condition it was taken.

I am, Sir,

Your obedient Servant,

(Sgd.) W.E.R. CHAMBERLAIN.

COPY.

U.K./A.5

PD.811/17/12

19th February, 1951.

The Secretary,
Ministry of Fuel & Power,
Petroleum Division,
7, Millbank,
London, S.W.1.

Dear Sir,

Petroleum (Production) Act 1934.

With reference to our letter of 14th February, 1951, in which we notified you that we have decided not to apply for a new licence over this area, we now await your instructions as to what action you wish us to take before abandoning wells Nos. 1 and 2.

If the Minister intends to abandon the area permanently we agree that the programme referred to in your letter of 11th December 1950 is satisfactory.

If, on the other hand, there is any prospect of gas production being required from No.1 well then we suggest that the alternative programme proposed would be more satisfactory, provided that the well is kept secure from interference or is inspected at intervals. In our opinion the only risk involved in leaving the well standing would be possible external corrosion of the casing. Even if gas production is not immediately in prospect we recommend that the abandonment programme be confined to the actual plugging of the wells leaving the cellar and foundations intact.

In these circumstances we presume there would be no object in abandoning No.2 (water well) as in its present condition it involves no hazard, and as we believe it might be possible with some additional work, to utilise it as an observation well for calculating any movement of the gas/water level.

Yours faithfully,
For D'ARCY EXPLORATION COMPANY LTD.

(Sgd.) W. Fraser.

c.c Mr. Comins
Mr. A. Morrison
Mr. Woodcock (Eakring).

COPY.

Ref: PD811/17/39

Your Ref: UK/A5

Ministry of Fuel & Power,
Petroleum Division,
7, Millbank,
London, S.W.1.

April, 1951.

The Secretary,
The D'Arcy Exploration Co. Ltd.,
Britannic House,
Finsbury Circus,
E.C.2.

Sir,

PETROLEUM (PRODUCTION) ACT, 1934.

I am directed by the Minister of Fuel and Power to refer to your letter of 19th February about oil prospecting licence area No. 118a and to say that the Minister requests that as your company intends to abandon the area the programme as set out in this Ministry's letter of 11th December, 1950, should be carried out in respect of Wells No. 1 and 2. It would be appreciated if you could advise this Ministry when operations have been completed.

I am Sir,
Your obedient Servant,

(Sgd.) N.E. MARTIN.

Copy

File

From Chief Petroleum Engineer To Mr. de Hamel, Concessions
Department
Our Ref. F&G/55 Your Ref. Date 15th February, 1951
DC/1703
Subject COUSLAND WELLS NOS. 1 & 2 : REFERENCE LETTER PD.811/17/12
OF 11TH DECEMBER, 1950

Reference your memorandum of 14th February.

It is presumed that we are under obligation to carry out any work required by the Ministry on surrendering the licence, but that it is considered that we should submit our views to cover alternative programmes.

First, if the Ministry decide that the area should be permanently abandoned, the abandonment programme outlined by them in their memorandum referred to is agreed as satisfactory.

Secondly, if the Ministry consider that there is any definite prospect in view that another party may wish to produce from No.1 well within a reasonable period, say a year or two, the alternative proposals on page 2 of their memorandum would, it is considered, be satisfactory; with the reservation that if the well should be left without watchmen it is essential that it should be made thoroughly secure from interference and be inspected at intervals. In our opinion the only risk involved in leaving the well standing as it is would be possible external corrosion of casing.

In these circumstances there would be no object in abandoning No.2 (water well) which in its present condition involves no hazard, and the plugging of which would be carried out at the same time as the plugging of No.1 should that be decided upon at some later date. In any case should No.1 well be put on production there is a speculative possibility that No.2 could be converted into a satisfactory observation well for calculation of movement of gas/water level consequent on production. This would involve plugging back in No.2 well any sands which are not now exposed in No.1 well and perforating the casing opposite the equivalent sand of the 1,582 - 1,632 feet sand in No.1 well.

Owing to lateral variation and lenticularity of the sands in this area it is uncertain whether perforation of the 1,900 - 1,908 feet sand, which has been correlated with the 1,582 - 1,632 feet sand in No.1 well, would provide a satisfactory water observation data for this sand. This could only be proved or disproved by observation of the effect of production from the 1,582 - 1,632 feet sand in No.1 well, with lower sands plugged off, on the water pressure on the 1,900 - 1,908 feet sand in No.2 well, with lower sands plugged off.

Thirdly, should the Ministry decide that the wells should be plugged but there be the remotest possibility of production being required from No.1 well in the future, it is recommended that the abandonment programme be confined to the actual plugging of the wells, no other work being carried out. It would then be a comparatively simple work-over job to bring the wells back on production from any particular sand desired by cleaning the cement out to below it and then gun perforating.

(Sgd) D. COMINS

Copy to:

Mr. A. Morrison
Manager, Bakring ✓

Enc. Min. of F&P letter PD811/17/12
of 11.12.50.

DC/SLS

3/1/50
2/3/50

Hto-

Memorandum

MR. W. M. DONALD.
From *SALSBURGH.*

MR. A. F. BREMNER.
To *EAKRING.*

a 4B.

Our Ref.

Your Ref.

Date *27-4-45.*

Subject *ELECTRICITY SUPPLY - COUSLAND.*

We enclose herewith letters in connection with the above supply and forms to be completed

W M Donald

ALL COMMUNICATIONS TO BE ADDRESSED TO THE COMPANY.

RAILWAY ADDRESS- UPHALL STATION.

SCOTTISH OILS, LIMITED,

GLASGOW & LONDON.

TELEGRAPHIC ADDRESS,
"SCOILITED", UPHALL.

TELEPHONE.
34 & 35 BROXBURN.

GMCL/IM.

Middleton Hall,
Uphall, Broxburn,
West Lothian.

25th April, 1945.

W.M. Donald, Esq.,
D'Arcy Exploration Co. Ltd.,
Salsburgh No.1 Site,
Wester Bracco Farm,
Plains,
Airdrie.

a.s.

Dear Sir,

Referring to our telephone conversation regarding supply of electricity at Caledonian Cement Works, Cousland, for the water pump, we enclose herewith letter received from The Lothians Electric Power Co., together with two application forms and Consumers Handbook, and shall be pleased if you will arrange to complete these forms and return one to the Power Co. as requested.

We will let you know what arrangements we make with Mr Helling regarding the connecting up of the supply.

Yours faithfully,
p. Scottish Oils, Limited.

G. A. W. Lennan.

Encl.

THE LOTHIANS ELECTRIC POWER CO.

EDINBURGH OFFICE
53 MELVILLE STREET
PHONE 30221

LONDON OFFICE
88 KINGSWAY, W.C.2

Associated with The British Electric Traction Co., Ltd.



TELEPHONE
MUSSELBURGH No. 115

~~H. C. BARR, M.I.E.E., M.I.E.E.E.I.~~
GENERAL MANAGER

22 HIGH STREET
MUSSELBURGH
SCOTLAND

OUR REF. DCR/RS. YOUR REF.

Twenty-fourth
April,
1945.

Messrs. Scottish Oils Ltd.,
Middleton Hall,
BROXBURN,
West Lothian.

Dear Sirs,

Cousland Bore.

Further to your telephone conversation with our Mr. Redfern to-day regarding a temporary supply for the motor at the old Caledonian Cement Works, Cousland, as this supply is only wanted for such a short time, we suggest that it should be charged under Scale No.1 as given in our Handbook enclosed.

We should also want you to bear the cost of any work involved in reconnecting and disconnecting this supply.

We understand that there is practically nothing to do except reconnect some tails ^{on} to our overhead line and instal the meter in the meter-box on the pole.

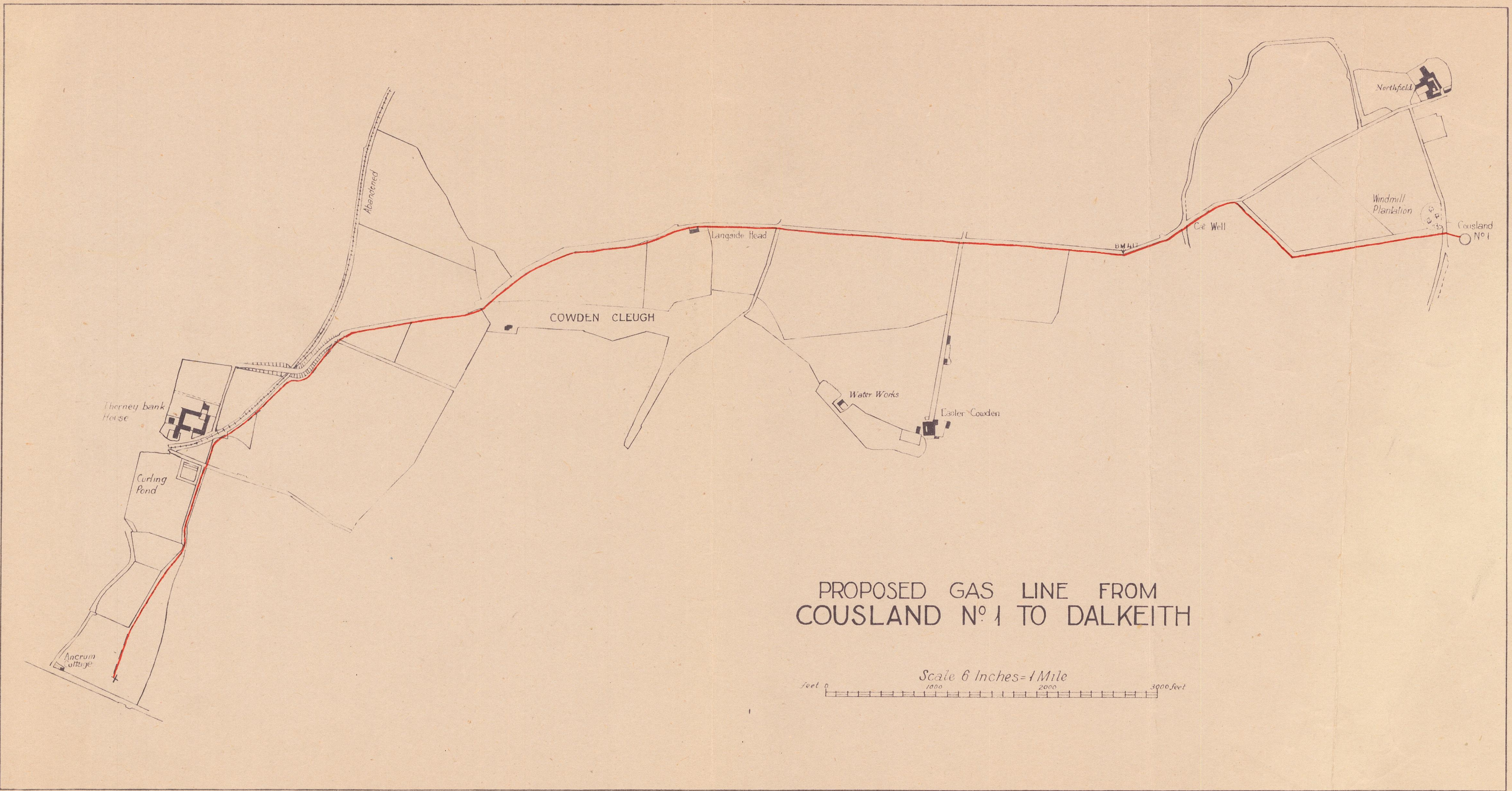
We enclose application card in duplicate, one of which we shall be glad to receive back duly signed as soon as possible.

We have instructed our District Engineer, Mr. Helling, ('Phone Haddington 140) to get in touch with you and arrange a time for connecting up.

Yours faithfully,

C H A Collins

C.H.A. Collins,
General Manager.



PROPOSED GAS LINE FROM
COUSLAND N^o 1 TO DALKEITH

Scale 6 Inches = 1 Mile
feet 0 1000 2000 3000 feet

4th September, 1941.

COUSLAND GAS.

Anglo-American and D'Arcy Co-operation in supplying, without guarantee, one million cubic feet of gas per day to pipeline

We understand that Edinburgh Gas Corporation use about $1\frac{1}{4}$ million gallons of gas oil per annum to produce oil gas in order to bring the calorific value of the coal gas up to 475 B.T.U.'s per thousand cubic feet. The oil gas produced is equivalent in thermal value to about one third of a million cubic feet per day of Cousland gas.

At the present price of gas oil - £9 per ton - the value of Cousland gas replacing gas oil would, on these figures, be approximately 7/- per 1,000 cubic feet delivered gas works. Taking the value of the remaining two-thirds of a million cubic feet per day, on a coal replacement basis, at, say, 2/- per 1,000 cubic feet, the overall value of the gas would be $3\frac{1}{6}$ d. per 1,000 cubic feet.

To arrive at the value at wellhead it is necessary to deduct capital charges for pipeline of, say, £20,000 and to base this on paying this off in three years. This amounts to 6d. per 1,000 cubic feet. Wellhead price would, therefore, be 3/- per 1,000 cubic feet.

It is next desirable to examine if this will recompense us for the expenditure in this area, including previous capital expenditure and expenditure required to supply this gas to pipeline

Approximately £70,000 have been spent in the Cousland area on well drilling and other work, which has resulted in the proving of a small gas field. It is estimated that:-

	p.a.
Area running charges on a producing basis + overheads would amount to:	£2,000
Depreciation on capital on a 3-year basis: (1) Drilling:	£70,000
(2) Estimated production expenditure to supply gas:	<u>2,000*</u>
	<u>£72,000</u> or £24,000 over 3 years.

Total charges, therefore, would be: £26,000 per annum

*This provides for running tubing, water separation, etc.

On a basis of D'Arcy providing 500,000 cubic feet per day for 3 years, this charge would amount to 2/10d per thousand cubic feet. A sliding scale should be arranged so as to provide for our not being able to supply this amount.

Royalty.

Our royalty obligation amounts to 10% on all monies received from the sale of any natural gas. Royalty on this basis of 3/- per thousand cubic feet would, therefore, be 3½d.

On the basis of 3/-, therefore, we should receive 2/8½d. per 1,000 cubic feet.

We feel, therefore, that, having regard to the national and commercial aspects of the undertaking, and also to the fact that no guarantee is required, we should offer this gas to the Government at 3/- per 1,000 cubic feet delivered into pipeline ex well.

Maintenance of deliveries.

The above calculations assume that the Anglo-American and ourselves will be able to maintain delivery of one million cubic feet/day between us for a period of at least 3 years. On present estimates, we could not maintain our share - half a million cubic feet per day - for much more than a year without drilling additional wells. Depths being only about 1,700 feet, these could be drilled for about £5,000, and at 3/- per 1,000 cubic feet, capital expenditure would be recovered after a production from each of about 35 million cubic feet. No.1 well produced over 30 million cubic feet in the course of a month's production test.

In order to cover ourselves should fresh drilling be unsuccessful in maintaining our offtake - either because of the reserves being largely drained by No.1 well, or because of depletion of our reserves by Anglo-American production, it may be advisable to attempt to establish a sliding scale of prices depending on offtake.

It is difficult to assess any entirely equitable scale, but the following would appear a suitable basis for discussion with the Mines Department:-

Joint A.I.O.C. & A.A.O.C.
Offtake - m.c.ft./day.

Price of gas per 1,000 c.ft.
delivered pipeline.

1.0	3/-
0.75	4/-
0.50	5/-

In addition to the above sliding scale for production, provision should be made to cover material changes in gas oil prices. The simplest method would be to relate the above prices of gas to the present price of gas oil, adjustments being made, say, for every 10% rise or fall in gas oil prices on a similar percentage.

Supt

1 st	200	5/-
2	200	4/-
3 rd	200	3/-

W.M.

from each Company

Memorandum

From *W.H. Cadman*

To *G. H. Coxon Esq*

Our Ref.

Your Ref.

Date *22-8-1941*

Subject

Conference on Natural Gas

*Herewith notes on the
Conference held at the Mines
Department this morning*

W.H. Cadman
~~*W.H. Cadman*~~
m

c.c. to Mr. Southwell

NOTE ON CONFERENCE HELD ON FRIDAY, 22nd AUGUST, 1941,
AT THE MINES DEPARTMENT.

- PRESENT:- MR. RAVENSHEAR (Assistant Secretary, in the Chair.
Mines Department)
- MR. LEPPER } PETROLEUM DEPARTMENT.
MR. H.W.P. GIFFARD }
- MR. G.H. COXON }
MR. W.H. CADMAN } ANGLO-IRANIAN OIL CO. LTD.
- MR. E.F. WHITTINGDALE (Manager of Production) } ANGLO-
Branch in U.K. } AMERICAN
MR. D.A. GREIG (Chief Geologist) } OIL CO. LTD.
- MR. EVETTS Technical Adviser to the
MINES DEPARTMENT on Carbonisation
of Coal, Gas etc.
- MR. BECKETT }
DR. MACFARLANE } MINES DEPARTMENT.
& ANOTHER }

Mr. Ravenshear said that the reason for calling the Conference was the shortage of gas coal and his Department was only interested in the utilisation of the natural gas in Scotland as a means of immediate economy in coal. He had estimated, from the figures given to him by the Petroleum Dept. of the quantity of gas available, that by using this gas it would be possible to release 1,000 ^(a thousand) ~~tons~~ tons of coal a week and in answer to a question by Mr. Coxon he explained how he had arrived at this figure.

Mr. Coxon then asked the Anglo-American representatives how much gas they had available. Mr. Whittingdale said that for a short term policy they could produce, within 3 months, probably 100,000 cubic feet of gas per day, but from the point of view of national effort they could produce a maximum of 500,000 c.ft. a day, ^{within} ~~for~~ 3 months, and for a period of one year. Later on in the

conference he said that the figures he gave were calculated and therefore could not be guaranteed.

Mr. Coxon said that the Anglo-Iranian could produce on a short term policy up to 500,000 cu.ft. of gas a day for a period of 2 years.

The question of gas oil and coke was referred to and it was stated that Edinburgh used about $1\frac{1}{4}$ million gallons of gas oil a year and also about 40,000 tons of coke a year. The total coal used by the Edinburgh Gas Works was of the order of 4,000 tons a week.

After a discussion Mr. Evetts summed up the position by saying that it was evidently not worth while for the Oil Companies to lay pipelines to take their gas to Edinburgh because of the uncertainty of their gas reserves as it was going to cost a lot of money to lay a long pipeline say to Edinburgh to supply gas for only 2 years. In his opinion it might be a much better economic proposition to supply the smaller local gas concerns.

Mr. Whittingdale said that their only interest was selling the gas commercially at the well head.

Mr. Ravenshear said that the question was what kind of guarantee should the Ministry of Mines give for either the Government or somebody else to pay for the pipeline.

Mr. Coxon said that it would require 20 miles of 4" pipeline to handle 500,000 cu.ft. of gas per day to Edinburgh and this length of line could be laid in about 6 months, provided that priority was given to the production and supply of the necessary pipes. The cost would be from £700 to £800 a mile assuming that the pipeline did not pass through a town. It was stated that Edinburgh had only one Gas Works -

namely, at Granton on the West side of Edinburgh to which all the gas would have to be piped in the first place in order to mix with gas of lower calorific value before distribution.

In answer to a question by Mr. Ravenshear, Mr. Lepper informed him that all the natural gas was owned by the Crown but the two Oil Companies had licences to exploit the gas in the same way as oil. The question of price was purely a commercial matter and concerned the *Oil* Companies only.

Mr. Evetts pointed out that the utilisation of the gas in this way for a short time would obviously entail a loss and that was the reason why the Oil Companies *had* *turned down their proposal* *hesitated* to supply *it* to the Gas Companies.^{xx}

Mr. Coxon said that his Company estimated that it would cost about £20,000 in capital outlay to lay say 20 miles of 4" pipeline and that in addition to this sum £2,000 or £3,000 a year would be required for production expenses, for an income of only £3,000 to £4,000 a year which was not sufficient to warrant this expenditure. The question for the Government was in his opinion whether it was worth while spending about £22,000 to save 50,000 tons of coal a year. If this coal had to be bought it would obviously cost more than £50,000.

It was generally agreed that the only fair way to deal with the matter would be for the Government to accept the responsibility and have a Government pipeline constructed

xx.

Mr. Lepper said that if the Government gave a guarantee it was conceivable that the life of the gas might extend to 5 years or more in which case the Government loss would be very small or they might even make a profit.

by the Oil Companies who would act as Managers and operate the pipeline on terms to be agreed.

Mr. Ravenshear agreed with this suggestion as put forward by Mr. Coxon. He said they would require to know what the Companies wanted for their gas.

It was decided to send a questionnaire in a few days' time to each of the Oil Companies concerned so that they could provide the Mines Department with replies to this and other questions arising from the meeting.

The representatives of both the Anglo-American and Anglo-Iranian Oil Companies expressed their willingness to co-operate to the fullest possible extent if it was decided by the Government to make use of this gas in the national interest.

W.S.H.C.

Any reply to this letter should
be addressed to the Director,
Petroleum Dept.

PETROLEUM DEPARTMENT,

DEAN STANLEY STREET,

MILLBANK,

S.W.1.

Abbey 9030

Telephone: ~~VICTORIA 9155~~

Telegrams: MININDUST,
SOWEST, LONDON.



Reference No. :-P.D.

For the attention of:
F. H. Coxon Esq.,

15 August, 1941.

Gentlemen,

Utilisation of Natural Gas.
D'Arcy Exploration Co. Ltd.

The possibility of the utilisation of natural gas from the D'Arcy-Cousland structure for the purpose of reducing the quantity of coal necessary for the production of town's gas in the above district has recently been under consideration. It is proposed to hold a round-table discussion on the subject at 12 noon on Friday, 22nd August in the Small Conference Room at the Mines Department, and I am to ask if you will be good enough to send representatives to this Meeting.

A similar communication is being sent to the Anglo American Oil Company Limited.

I am, Gentlemen,
Your obedient Servant,

S Mepper

The Anglo Iranian
Oil Co. Ltd.,
P.O. Box 1, Chertsey Road,
Sunbury-on-Thames.

BP.

Memorandum

From MR.W.H. CADMAN.

To MR.G.H. COXON.

Our Ref.

Your Ref.

Date 14th August, 1941.

Subject UTILISATION OF COUSLAND NATURAL GAS.

On Tuesday afternoon Mr. Lepper of the Petroleum Department rang me up to say that the Secretary for Mines was pressing his Department to get the natural gas resources of this Country made use of as quickly as possible in order to relieve the coal situation, in view of the shortage of coal. He said that Mr. Ravenshear of the Mines Department had this in hand and that R. was a member of the Committee on Alternative Fuels who were dealing with this subject. Apparently the first thing that Ravenshear did was to write to Mr. Jameson of the Edinburgh Corporation Gas Dept. to see if he could make use of this gas. Mr. Jameson had replied to say that he had been considering this question for a long time with Mr. W.H. Cadman of the A.I.O.C. and that he had gone into it very fully with W.H.C. in Edinburgh about 6 months ago. In his letter Mr. Jameson said (but quite wrongly) that we had informed him that "if 1 million cubic feet of gas a day was used for 3 months, this would exhaust the total gas reserves" and he went on to say that that was the reason why he had ruled the gas out for use in Edinburgh as the cost of piping such a small quantity was out of the question. Mr. Ravenshear had sent this letter to Mr. Lepper for his comments in view of the fact that the figures given by Mr. Jameson did not tally with those which had been supplied officially to the Government by A.I.O.C. Ltd.

I informed Mr. Lepper that Mr. Jameson was just recovering from a serious illness when I had the last interview with him and that he had evidently forgotten what I had told him as the figures he gave in his letter were quite wrong. I had taken full notes at the interview in March last in Edinburgh and these were incorporated verbatim in the official report on this subject which I had prepared for the Company at that time. An output of 1 million cubic feet a day for 3 months was never mentioned at the interview. This would represent a reserve of only 92 million cubic feet of gas which is quite wrong; the figure supplied by us to the Petroleum Department based on the data available at the time was a minimum of 250 million cubic feet assuming a partial water drive. I need

not repeat the figures actually given to Mr. Jameson which were exactly as stated in my report. Mr. Lepper said that both he and Ravenshear were agreed that something ought to be done quickly in the national interests to make use of this gas in order to relieve the coal situation. He himself estimated a gross total reserve of natural gas recoverable down to a pressure of say 5 lbs. per square inch, from the combined fields of A.I.O.C. and the Anglo-American at Cousland to be 750 million cubic feet. It was in his opinion very desirable that these two Companies should co-operate in developing the use of this gas. A few months ago he said the supply of compressors and cylinders for using it as compressed gas was out of the question, but the metal situation had greatly improved since then and this was probably not the case today. If, however, the use of this gas as motor fuel was still ruled out, then he thought that the local Gas Companies in the Cousland vicinity ought to take and use this gas and he suggested that A.I.O.C. and the Anglo-American could begin by supplying them with $\frac{1}{2}$ million cubic feet a day for 6 months at the end of which time it would be possible to calculate accurately the total available reserves. The interview ended by Mr. Lepper requesting me to let Mr. Ravenshear himself have a copy of the report which I prepared for A.I.O.C. if only to avoid going over the ground again which had already been covered by me. I promised to put this request up to the Company and to let him know if I was authorised to send him a copy of the report.

As a result of my telephone conversation with you this morning (August 14th) I informed Mr. Lepper that his request had been considered by Mr. Coxon who had instructed me to reply that as the report in question covered many things which were of interest to the Company only, in addition to the data which he required, it would be better for Mr. Lepper to write officially to A.I.O.C. suggesting a round table discussion on the subject to take place in his, Mr. Lepper's office at the Petroleum Department, when we should be only too glad to supply any data required. Mr. Lepper in replying said that he was subordinate to Mr. Ravenshear of the Mines Department in this matter as he was primarily concerned with the proposition at the request of the Secretary for Mines. He would have preferred therefore to have been supplied with a copy of the report with any matters likely to be of no interest to them, deleted. This would have enabled both Ravenshear and himself to study it closely in the evenings as they usually remained all night at the Ministry.

He then asked me if I knew Mr. Ravenshear and on my saying that I did and that I would speak to him about this round table discussion if he liked, he said that he would welcome my doing so. I rang up Mr. Ravenshear and he welcomed the idea of a round table discussion saying that he would refer this to the Petroleum Department at once and get them to make arrangements for the conference as suggested by you. He thought that Mr. Southwell ought to be present at the conference.

(I formed the impression that Mr. Lepper did not like this question of the utilisation of natural gas being handled by the Ministry of Mines and ~~that~~ he regarded it as a problem for the Petroleum Department and also that he, Mr. Lepper, was playing second fiddle to Mr. Ravenshear, who apparently holds a higher position in the Mines Department than Mr. Lepper does in the Petroleum Department).

The above sums up the situation as it stands at present.

W.H.C.

MR. JAMESON.

COUSLAND GAS.

The possibility of developing Cousland Gas as a marketable proposition has been examined.

The first point requiring decision was the quantity available, and Southwell has laid down that some 200,000 ft./day for a period of 5 years is the maximum that could be counted on with any certainty.

A period of guaranteed supply shorter than 5 years would not, obviously, interest any possible purchaser on account of the arrangements and reorganisation he would have to make to handle our gas.

With these figures then as a basis, viz., a maximum of 200,000 ft./day over a period of 5 years, the following possibilities have been examined.

1. MUSSELBURGH.

The Management here have advised us that under normal conditions they would be interested in a proposition to handle Cousland Gas, but that to-day their principal source of revenue was from the sale of the coke they were making.

If Cousland Gas were piped to Musselburgh, a distance of about 4 miles, the quantity available could take care of the whole of the market, if the gas works were shut down, but this would entail the loss of revenue from coke sales and, as already stated, the Management have indicated that they are not interested.

2. GROUP OF SMALL GASWORKS ADJACENT TO COUSLAND.

To enable a market to be found for 200,000 ft./day of gas would require piping it to some 8 gasworks, as sales of gas from the individual works are relatively small.

The works selected are all operated by one concern, the nearest being some $2\frac{1}{2}$ miles from Cousland and the most remote about 9 miles.

The proposal would be to run a 4" line to the nearest works, which incidentally has the biggest sales, and then to bifurcate in Y form into 3" and 2" lines to the remaining works.

It should be borne in mind that Cousland gas has double the calorific value of town's gas and would require dilution by the purchaser before distribution, necessitating certain plant and equipment and the exercise of careful control.

The scheme outlined above would necessitate some 20 miles of 4", 3" and 2" pipelines, which, at to-day's prices, is estimated to cost at least £18,000. This figure does not allow anything for wayleaves or similar charges.

In view of the limitation of 5 years we must expect to recover the capital expenditure during this period so there would be a fixed charge of at least £3,600 per annum.

In addition to this there will be certain charges for supervision and control, which will be relatively small, as the gas is available at sufficiently high pressure for direct distribution through the piping system proposed, but it is felt that £1,000 per annum is not too large a figure to put down for these services.

There will therefore be minimum charges amounting to some £4,600 per annum to be recouped.

In regard to the price that we might expect to get for Cousland Gas, the Manager of the Edinburgh Corporation Gas Department advised us that his coal gas of 475 B.T.U's cost under present-day conditions 1^s. 2^d. per 1,000 ft. to produce.

This figure, however, includes certain fixed charges which would still have to be met even if the gasworks were shut down so, although Cousland Gas is of higher calorific value than town gas, when the above fixed charges together with the cost of diluting, supervision etc. are added, it would not be safe to estimate a higher value for Cousland Gas than 1/s. per 1,000 ft. delivered at works.

This figure was confirmed by other possible purchasers as being about what they would be prepared to pay.

It is therefore felt that a higher price than 1/s. per 1,000 ft. cannot be expected and on this basis the following returns would be netted:

For the sale of	100,000	cubic feet/day	-	£1,825/annum
" "	" "	150,000	" "	- £2,737/annum
" "	" "	200,000	" "	- £3,650/annum

It will be seen, then, that the income from even the maximum sale of 200,000 cubic feet does not make an attractive proposition.

Summing up, it is evident that at the present time there is not sufficient attraction to warrant a commercial proposition being developed, and it is suggested that further work on this should be left in abeyance pending more normal times, when it is felt that the gas companies could be approached and a scheme developed.

1. a. H. G. H. Coxon

I agree that Cousland Gas

15th May, 1941.

is not a commercially attractive proposition on the basis of replacing Coal Gas.

J. G. Jamieson

22 May 41

*Let us have
file.*

Memorandum

From FIELDS BRANCH,
SOUTHWELL. **To** FIELDS BRANCH,
SUNBURY. (MR. SOUTHWELL)

Our Ref. DC/211 **Your Ref.** **Date** 3rd May, 1941.

Subject COUSLAND GAS EXPLOITATION.

The Cousland position has been re-examined following your request of 25th March for our views on the maximum offtake which could safely be guaranteed over a period of five years. Although previous estimates are confirmed (ref. our draft report for Petroleum Department on U.K. Gas Reserves in February last year), it is however quite impracticable to arrive at any figure which can safely be guaranteed. This is because we have not yet proved any contact with the edge water in the two sands at present exposed and have therefore no knowledge of either the position of gas:water level in them or of its reaction to production.

In allowing for edge water encroachment in estimating the reserves recoverable from these sands in No.1 well we can therefore only be guided by data obtained from the lower (1760 - 1806) sand now plugged off. From these data we have reached the conclusion that a reasonable figure for the volumetric competency of water drive is that 50% of the gas produced during the production test of the sands now exposed was replaced by edge water in the course of the test.

This, you will appreciate, necessarily introduces a speculative element into calculations, but taking everything into consideration our opinion is that it would be reasonably safe to programme on producing something of the order of 200 m.c.ft. from No.1 well in its present condition, though anything in the nature of a guarantee should if possible be avoided.

This is equivalent to 100,000 c.ft. per day over a five year period; but we would suggest that if a market can be found it would be a better proposition to programme for an initial production stage at a higher rate over a shorter period - say 200,000 c.ft./day for two years. Capital expenditure and annual running charges would be the same and the potentialities of the Field would be more rapidly determined. The difficulty of a guarantee might be obviated by granting initial purchasers an option on the purchase of possibly enhanced supplies proved during the initial production stage.

MEMORANDUM

Initial flowing pressure would be of the order of 600 # and provided that any water which may enter the hole can be successfully evacuated (see later) it is speculatively estimated that flowing pressure should not fall below 200 # to 300 # during the production of 200 m.c.ft. Provision of suitable compressor capacity may therefore be necessary if a fixed high delivery pressure is required.

Bases and methods of calculation are outlined in Note 1 attached. There are no factors of safety in the actual calculations though it may be noted that the estimate of 200 m.c.ft. compares with a figure of 420 m.c.ft. if no water encroachment had taken place during the production test of sands now exposed.

The real factors of safety are:-

1. That even the maximum limit for calculable recovery from No.1 well is very much less than the gas content of the sands exposed calculated from their areas, thicknesses, and porespace, which exceeds 2000 million cubic feet. On a low rate of production the well may therefore drain a greater area than it had at the conclusion of the production test at 1.0 m.c.ft./day. (Further wells could also be drilled if No.1 proves to be commercial.
2. That in the event of a shortage:-
 - (a) the lower sand 1760 - 1806 feet could be brought in again; though this is undesirable owing to the water difficulties involved.
 - (b) the upper sand 1248/74 feet could be gun perforated. There is indeed a case for considering doing this before putting the well on production, on the prospect of obtaining some slight oil production as well as gas. This sand was worth 30,000 c.ft. gas per day when drilled but this rate might be improved by gun perforation. On Mr. Falcon's estimate the volume of this sand above gas:water level is large.

Expenditure Involved(a) Capital

You will recollect that by the end of the production test of the sands now exposed water had risen some 140 feet in the hole. It was considered probable that this was returning drilling water of which some 20,000 gallons had been lost in the course of gun perforation, etc., but the point was never cleared up as it was considered inadvisable to flow the well hard to eject this water and the expense of running tubing to do so was not considered justified.

If the well is put on continuous production it will be essential to run tubing, as otherwise a false decline in the wells capacity or flowing pressure will be caused by the increasing back pressure on the sands caused by rising water in the casing, especially if the water is in fact edge water of the lower (1720-35) sand and not drilling water.

Our proposal is normally to produce gas from the annular space via a water separator and mist extractor to deal with any small quantities of water which may be entrained and, intermittently at periods to be determined by experience say once a month for example, to flow the well through the tubing to eject accumulated water by gas lift. The annular space would be shut during this operation; a sufficient proportion of the production ex tubing being passed through the separator and mist extractor to meet continuous gas offtake requirements, and the remainder taken off to waste. Judging by similar experience at Eskdale it is probable that a few hours flow would be sufficient to evacuate accumulated water.

The cost of running tubing as per Note B (Messrs. Seamark and Bremner) is:- £450

The cost of production equipment, installation and commissioning as per Note C (Messrs. Dickie and Johnson) is:- £600

Total £1050

say £1100

Enclosures: Notes A, B, and C.

(b) Running charges

Expenditure Involved

Operation should be practically automatic except for reading pressures and meters, if volumetric; or changing orifice meters charts which would be forwarded to Bakring for computation. Arrangements can presumably be made with the Anglo-American Oil Company for technical assistance in case of emergency and provision is therefore only necessary for unskilled labour on site with one man in charge who will also take shifts. per annum

Labour and 3 men and 1 I/C @ £20 week = £1040

Occasional A.I.O.C. technical supervision, travelling, etc. and provision for A.A.O.C. technical assistance in emergency (say) £200

Telephone, Stationery and office charges £50

Total say £1290 p.a.

Further Tests to confirm figures we are prepared to guarantee.

None recommended. Establishment of position and behaviour of edge water in the main sand exposed 1582 - 1632 would be a major operation involving another well down flank and a prolonged production test.

Enclosures: Notes A, B, and C.

DC/CEP

COUSLAND NO.1.BASES OF CALCULATION OF QUANTITY AND RATE OF PRODUCTION
OF GAS RECOVERABLE FROM THE WELL FROM SANDS AT PRESENT
EXPOSED.Facts.

1. Sands now exposed 1582 - 1632
1720 - 1735
2. Production test. 30.2 m.c.ft. at S.T.P. were produced during months test 3.11.39 - 2.12.39 of these two sands combined. Flowing pressure fell from 575# gauge to 545# at 1.0 m.c.ft./day, decline being partly attributable to rise of presumably partly gassified water from 1740 feet to 1600 feet during test. A.B.HDP/Production Rate Curve is available. The BHDP at 1.0 m.c.ft./day is about 35#.
3. Reservoir pressures (Calculated from Closed in Pressures)
 - (a) Before test 669.5# abs.
 - (b) On reaching apparent equilibrium shortly after test 10/11 - 12.39 627.7# abs.
 - (c) On 23.7.40 653.0# abs.

Method of Calculation

$$R = \frac{G \left(1 - \frac{E}{100} \frac{P_2 D_1}{P_1 D_2} \right)}{\left(1 - \frac{P_2 D_1}{P_1 D_2} \right)}$$

Where R = Initial Reserves; G = Production;
 P_1 & P_2 are Initial & Final Reservoir Pressures
 D_1 & D_2 are Corresponding deviation factors
 E = volumetric efficiency of water drive unknown
 (i.e. % volume of gas replaced by water.)

RATES OF CALCULATION OF QUANTITY AND RATE OF PRODUCTION OF GAS RECOVERABLE FROM THE WELLS IN BANDS AT PRESENT

A value of 50% has been used for E when applied to period 8.11.39 - 11.12.39. This value is arrived at from a consideration of vertical efficiency of water drive on which we have a line from the behaviour of the 1760 - 1806 sand, and from a calculation of the position of gas:water level in the 1582 - 1632 sand (at 1730 feet) assuming initial its water pressure to have been the same as in the 1760 - 1806 sand. It will be appreciated that a higher value for E should be used if applied to period 8.11.39 - 23.7.40 but we have no line on this. A large number of subsidiary calculations are available supporting the figures quoted above.

5. Reservoir pressures (Calculated from Closed in Pressures)

- (a) Before test 6.9.39
- (b) On reaching apparent equilibrium shortly after test 10/11 - 12.39
- (c) On 23.7.40

Method of Calculation

$$R = G \left(1 - \frac{P_1 D_1}{100 P_2 D_2} \right) \left(\frac{P_1 D_1}{P_2 D_2} \right)^G$$

$$\left(1 - \frac{P_1 D_1}{P_2 D_2} \right) \left(\frac{P_1 D_1}{P_2 D_2} \right)^G$$

Where R = Initial Reserve; G = Production;
 P₁ & P₂ are Initial & Final Reservoir Pressures
 D₁ & D₂ are corresponding deviation factors
 E = volumetric efficiency of water drive unknown
 (i.e. volume of gas replaced by water.)

NOTE B.

COUSLAND I : COST OF RUNNING TUBING TO SAY 1730 FEET

Driller 3 weeks	£45. 0. 0.
Labour 4 men	70. 0. 0.
Transport of pump, engine and tubing	40. 0. 0.
Fuel	10. 0. 0.
Tubing	170. 0. 0.
Hire of Cardwell say £1. 10. 0. day for 1 week,	11. 0. 0.
Well head	26. 0. 0.
Consumable stores - valves, etc.	20. 0. 0.
Hire of pump and engine	30. 0. 0.
Incidentals, travelling, etc.	20. 0. 0.
	<u>£442. 0. 0.</u>
	Say <u>£450. 0. 0.</u>

This scheme covers for producing gas at well head only.

MCS/CEP

COUSLAND I : COST OF CAPITAL EXPENDITURE ON PRODUCTION
EQUIPMENT TO PUT WELL IN POSITION TO
PRODUCE 200,000 C.FT./DAY AT 600# FLOWING
PRESSURE DELIVERED EX SITE.

	£.	s.	d.
<u>Separator and Mist Extractor</u>			
20 ft. 11 $\frac{3}{4}$ casing 14/6d./ft.	14.	10.	0.
2 flanges @ £16 each	32.	0.	0.
2 blank flanges @ £2 each (bottom of vessels assumed to be welded)	4.	0.	0.
2 joint rings 25/-	2.	10.	0.
2 sets bolts & nuts (£2.15.0. + 50% per set)	8.	5.	0.
Workshop charge on separators for internal fittings, screwing for flanges and external pipe connections	say	23.	15.
		<u>0.</u>	
	£85.	0.	0.
2 liquid level regulators and valves £100 each	200.	0.	0.
2 sets sight glasses	10.	0.	0.
2 pressure gauges 0/1000 lbs and cocks	8.	0.	0.
1 Gas reducing valve	38.	0.	0.
1 L.P. relief valve	10.	0.	0.
1 pressure gauge 0/100 lbs and cock	4.	0.	0.
Miscellaneous pipe and fittings	20.	0.	0.
Provision for metering arrangements (dependent on delivery pressure required)	100.	0.	0.
A.R.P. Shelter £14. 17. 6. plus £5. 2. 6. for erection	20.	0.	0.
Allow site erection charges	50.	0.	0.
Technical supervision of installation and commissioning	say	20.	0.
		<u>0.</u>	
Total	£565.	0.	0.
		<u>0.</u>	
	say	£600.	0.
		<u>0.</u>	

2nd May, 1941.

-2-

COUSLAND GAS UTILISATION.

PROPOSAL 1 :-

PROPOSAL 1 :-

To pipe 200,000 standard cu.ft/day of Cousland natural gas to local gas companies operated by the British Electric Traction Company.

This gas has a nett calorific value of 892 B.T.U.s. per cu.ft. and is therefore equal to some 380,000/400,000 cu.ft/day of town gas of calorific value 450/475 B.T.U.s. per cu.ft. At 365 days/annum this equals 140/145 million cu.ft.

An examination of the markets in the vicinity shows that this quantity equals approximately the annual sales of the following gas companies :-

Dalkeith	=	54.4	million	cu.ft/annum.
Newtongrange	=	23.0	"	"
Gorebridge	=	7.5	"	"
Lasswade	=	13.0	"	"
Loanhead	=	16.3	"	"
Rosewell	=	5.0	"	"
Penicuik	=	25.1	"	"

144.3 million cu.ft/annum.

The Cousland gas has too high a calorific value to be distributed per se and will require dilution or other treatment to bring it down to the normal Town's gas calorific value of 450/475 B.T.U.s. per cu.ft.

It is stated in Mr. Southwell's letter that Cousland Well No.1 could supply gas at an average delivery pressure of 400 lbs/sq.inch.

If this pressure were used to transfer 200,000 cu.ft/day to the consuming areas the lines involved would be very small, and it is assumed for the purposes of this investigation that the gas is available at 20 lbs. pressure only. This allows some latitude for fall in pressure of the field.

The capital cost of the piping system is estimated at £18,000

If it be assumed that the gas be sold at 1/- per 1,000 cu.ft. the following returns would be netted :-

100,000 cu.ft/day @ 1/- per 1,000	=	£1,825	per annum.
150,000 " " " " " "	=	2,737	" "
200,000 " " " " " "	=	3,650	" "

P.T.O.

COUSLAND GAS UTILISATION.

PROPOSAL 2 :-

To pipe, say, 60 million cu.ft/annum to the Musselburgh Gas Company only.

Using the same factors as in Proposal 1, this would involve some 4 1/2 miles of 3" pipe which, with accessories, would cost £6,000.

The return, at 1/- per 1,000 cu.ft., on 60 million cu.ft/annum, would be £3,000 per annum.

An examination of the markets in the vicinity shows that this quantity equals approximately the annual sales of the following gas companies:

Dalkeith	24.5	million cu.ft/annum.
Newtonrange	23.0	" " "
Gorebridge	17.5	" " "
Laswade	13.0	" " "
Loonhead	16.3	" " "
Rosewell	5.0	" " "
Penicuik	25.1	" " "

*7 1/2 miles of 3" pipe
how to connect
between the main lines*

144.3 million cu.ft/annum.

The Cousland gas has too high a calorific value to be distributed per se and will require dilution or other treatment to bring it down to the normal town's gas calorific value of 450/475 B.T.U.s. per cu.ft.

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150,000 " " " " " "	=	2,737 "
200,000 " " " " " "	=	3,650 "

Memorandum

From MR. C.A.P. SOUTHWELL. **To** MR. G.H. COXON.

Our Ref. **Your Ref.** **Date** 17th April, 1941.

Subject EXPLOITATION OF COUSLAND GAS.

The information which we supplied to the Government, based on Comins' work, that Cousland No.1 well could supply half a million cubic feet of 1000 B.T.U./cubic feet gas over a period of about a year to a year and a half, at an average delivery pressure of about 400 lbs. per square inch, is a reasonably conservative figure.

It can, therefore, be assumed that the present well could supply about 100,000 cubic feet of gas per day at a suitable flowing pressure for, say 10 years.

With a supply of this order the most suitable outlet, from W.H.Cadman's Report, appears to be the Musselburgh Town Gas Supply of the British Electric Traction Company, the gas works of which are situated about 4 miles from Cousland. They sell about 120 million cubic feet per annum and, we assume, would be interested in, say, approximately half this amount - 60 million cubic feet per annum.

It is estimated that the value of this gas to us would be of the order of £60 per million cubic feet, so that the gross return on this supply would be of the order of £3,600 per annum. I have no idea what our expenses would be in this connection.

Although business on these lines would appear to give too small a return to justify our undertaking any major capital expenditure, it would be useful in that it would show us how much gas was available and might result, if our estimate of the reserves is too conservative, in the extension of this business to the other small gas undertakings situated on the perimeter of a circle of about 5 miles radius with Cousland well in the centre.

CAM.

cc. Director, Production Department.

File

25th May, 1938.

COUSLAND : PIPELINE CAPACITIES AND COSTS.

Attached are two graphs showing pipeline capacities for varying sizes and well flowing pressures (a) to Edinburgh 8 miles (b) to Dalkeith 5 miles.

Some rough figures for costs of lines - ignoring wayleave costs are given below as a preliminary guide. For accurate figures R. & T. Branch should be consulted.

Pipeline - Costs per mile.

45%

Iran figures as rough guide only :-

	<u>Material</u>	<u>Labour</u>	<u>Total</u> <u>say</u>
	£	£	£
12"	2400	330	2700
10"	1860	275	2100
8"	1250	220	1500
6"	850	165	1000
4"	455	110	600

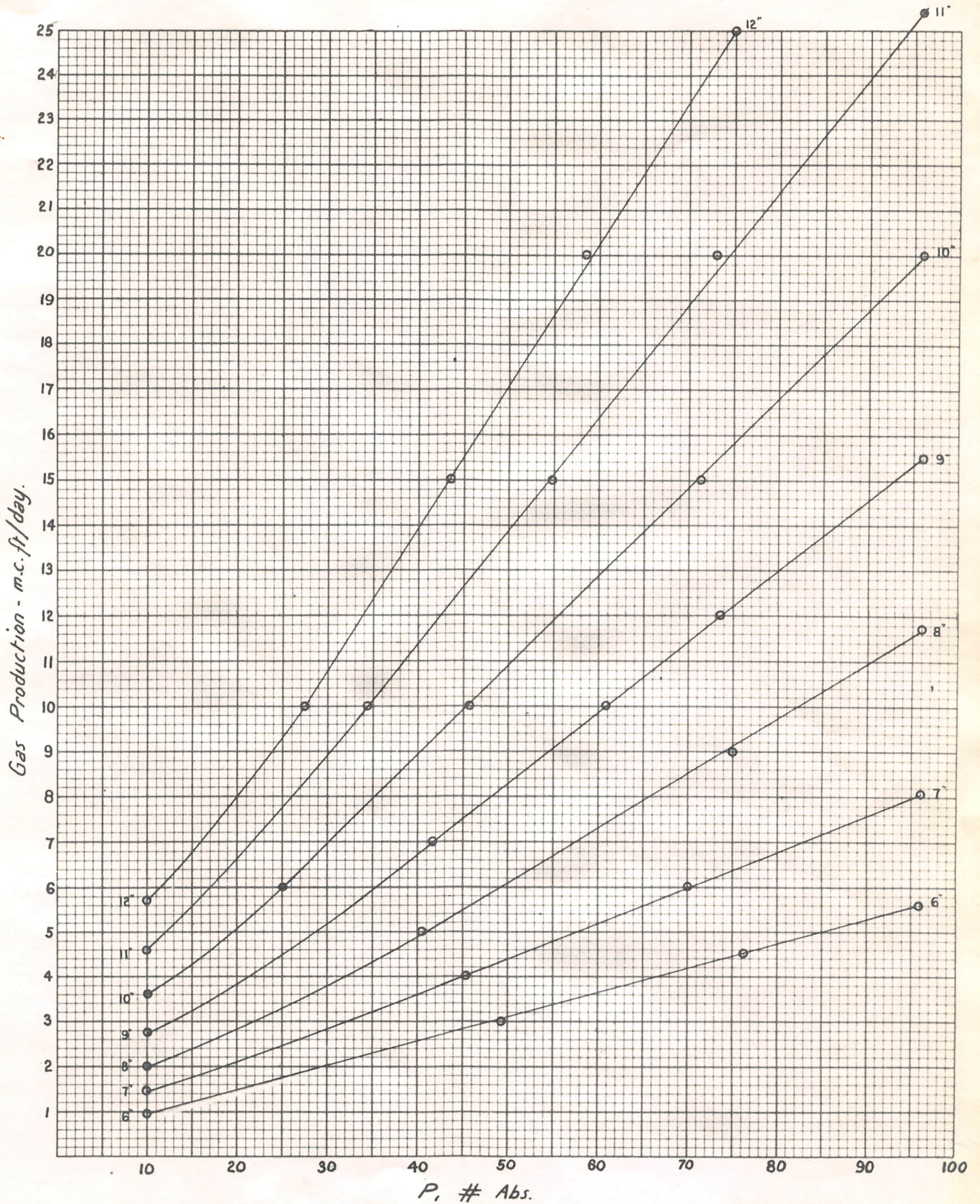
Above estimates applicable to a buried line.

For a surface line it is reasonable to deduct 20 - 25% on the total.

(Sgd.) D. COMINS.

Authority Chart for computing Gas line flow by
 W.L. Riftenberick, in "Western Gas"
 April 1927.

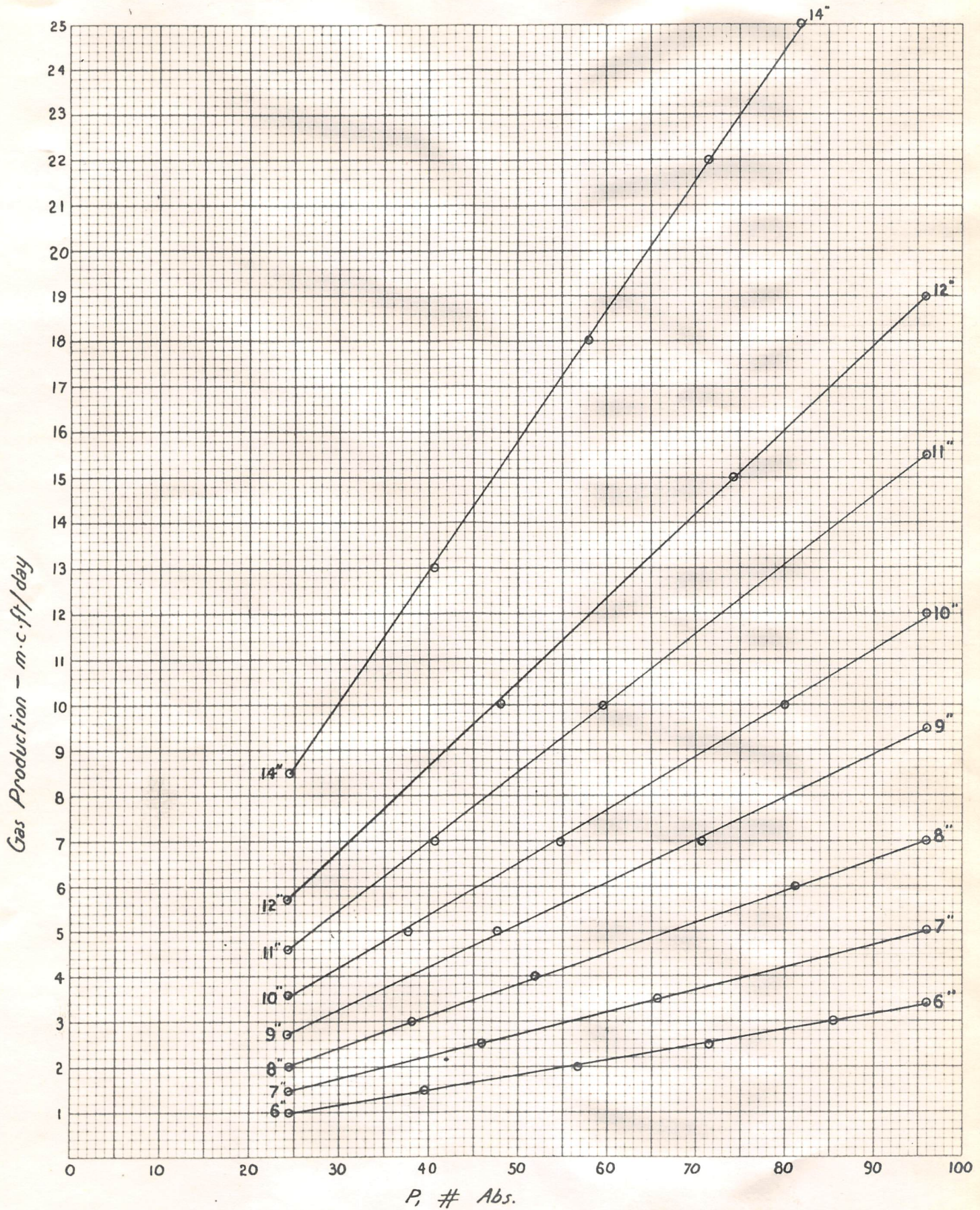
Size of Pipe 3 miles in length required under
 varying conditions of Gas Production and
 well head Pressure.
 (sp. Gr of Gas. 0.58 cf. air)



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Authority - Chart for computing Gas Line flows
 by W.L. Rifenberck, in "Western Gas"
 April 1927.

Size of Pipe 8 miles in length required under varying
 conditions of Gas Production and well head Pressure
 (sp. Gr. of Gas - 0.58 of air.)



N/12

Copy

From MR. P. T. COX To MR. B. R. JACKSON

Our Ref. Your Ref. Date 13th OCT., 1936.

Subject TEST WELL LOCATION ON COUSLANDS
ANTICLINE, SCOTLAND.

Our recommendation for a first test well on the Couslands structure is that it should be located within the area shaded red on the attached map (sheets Nos. Edinburghshire VIII N.E. and IX N.W., 6" to 1 mile Ordnance Survey). On the west of this area and extending into it, there are extensive quarry workings from which underground galleries have been driven. In selecting the actual site for the well it will be necessary to avoid these workings and I am now in touch with the Mines Department from whom I hope to obtain a plan of the galleries.

Dr. Allison has reported that the owner of the land in question is the Earl of Stair and that the tenant of most, if not all, of the area is a Mr. Mercer of Southfield, Dalkeith. Dr. Allison called on the Earl of Stair's factor, Mr. Robert Smith of Cranstoun Riddel, Lathhead, E. Lothian, who expressed a fear that the local water supply might be damaged by drilling for oil. This supply is drawn from wells in the Carboniferous limestone and we shall have to ensure that these beds are adequately cased off but with proper care there should be no real danger of contamination.

I shall examine the question of our own water supply in detail at an early date but if our requirements are only of the order of 3,000 galls. per day it seems probable that a shallow well or wells will provide all that is required.

The survey of the Couslands - D'Arcy structure recently carried out by Dr. Allison has shown that there is probably less than 200 ft. closure between the Couslands and the D'Arcy domes. Since the D'Arcy end of the anticline is held by the Midlothian Petroleum Syndicate and the necessity for competitive drilling may arise, I am strongly of the opinion that we should begin operations in this area as soon as possible.

(Sgd.) P. T. COX.