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CANADIAN BUILDING

DEPARTMENT OF THE INTERIOR
CANADA

Mining Lands and Yukon Branch

File 137380.

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General Delivery
Medicine Hat, Alta
Dec. 2/19.

Dear Mr Finnie, -

On September 24th you turned over to me some correspondence relating to the proper utilization of the residual gas from the "Dingman" Gasoline Extraction Plant, with the request that I make an inspection in the near future.

For several reasons I have been delayed in making this inspection but on the 21st ultimo there appeared in the Calgary Herald a complaint that 4000,000 cubic feet of gas per day was allowed to waste from the extraction plant. Soon afterward there was published a reply to the editorial, written by Mr. A. W. Dingman (see enclosed clippings). I thought it best to leave my work here in Medicine Hat and to make an inspection of the Dingman plant immediately. The inspection was made on the 27th Ultimo.

Living to the very severe weather I could not make as detailed an examination as I would like to have done and I could not insist upon them uncapping the wells for the purpose of measuring the flow as it would have caused hardship to those depending on the gas for fuel.

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2. *residual gas.*
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At the time of my visit the gasoline plant was running and the residual gas was being partly consumed in the company's service lines while the surplus was escaping to the atmosphere through a 4" vent pipe. I measured the volume of the escaping gas with pitot tube and found it to be.

--- 2, 223, 360 cubic feet per 24 hours

The following details are submitted in order to give you as much information as I have available. The case is one of considerable difficulty in which to offer definite suggestions.

The "Dingman" gas field is located in section 6 Township 20 Range 2 west of the 5th meridian. The gas field is probably less than a mile in diameter (see attached plan). The only wells producing any quantity of gas are wells Nos. 1 and 2. of the Calgary Petroleum Products Co. Other wells drilled on the sections surrounding these wells are not producers. (A small quantity of gas has been found, recently, in the Illinois Alberta well about two miles north and an important flow was encountered in the old Western Pacific Well a mile to the south. Gas is also produced in the Record well some ten miles south but this is really another field and will not be affected by the production from the Dingman field.)



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Attached to this report is a list of the gas horizons in Wells Nos. 1 and 2. This list was supplied by Mr. A. W. Dingman. See also, the sketch indicating these different horizons and the relation of the gas sands found in the two wells.

In the vicinity of Well No. 1. there has always been a large natural waste of gas from springs. This gas comes from the uppermost gas sand found in the well, which in turn is probably fed from the the deeper sands. Indeed it has always been my opinion that all the gas horizons in these wells have obtained their gas from a much deeper main supply, not penetrated by the drill, through breaks and small faults that occur on the top of this anticline. Though, of course, the rate of replenishment from deeper sources will not be rapid enough to prevent the exhaustion of the field.

The gas from horizons above 2500 feet in No. 1. is taken from the outside casing and is called the "shallow gas". The gas from the inner casing comes from below 2500 feet and is called the "deep gas". The deep gas has the greater volume and pressure.

The wells were drilled in 1913-16 and when I was stationed at No. 1. in 1914 the rock pressure was 210-15 according to Mr. C. W. Dingman the last measurement.



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of the well gave only 65 pounds pressure. By using the closed pressure method practised by the Treasury Department of the U.S. government. for determining the depletion of a gas field (See manual of Oil and Gas Industry under the Revenue act 1918 - Govt. Printing Office Washington).

$$\frac{\text{Present gauge pressure} + \text{barometric reading}}{\text{original gauge pressure} + \text{barometric reading}}$$

= Fraction indicating portion of original volume remaining in the field,

It would appear that there is about $\frac{1}{3}$ of the original volume of gas remaining in the Flemingman field. Probably most of the gas was wasted during the drilling of the wells, since owing to the extreme difficulty of drilling in this field the greater part of the hole is left uncased for long periods and therefore there is no way in which the gas flows encountered at the various depths may be controlled.

Some photos of the extraction plant are submitted. These do not indicate the extent and costliness of the plant. At the time of my visit the plant was still in charge of an agent of the Hope Natural Gas Company who are installing the ^{machinery} plant. I was told that ~~at~~ ^{on} ~~an~~ ^{one} occasion ~~times~~, the plant was shut down for days at a time while at other times it was running to capacity.



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The deep gas from No. 1. and all the gas from No. 2. is run through the main plant. While the shallow gas of No. 1. is run through a separate unit as it is of too low a pressure for the main plant.

The residual gas is discharged from the absorbers at 55 to 65 pounds pressure. From the discharge the gas either enters the service lines or flows from a vent pipe to the atmosphere. The amount of gas which is wasted is that which the consumers lines will not take from the extraction plant.

The following is a list of the consumers supplied from the residual gas.

Illinois Alberta Oil Co.

- 1. Boilers
- 4 houses

3. Farm Houses

Alberta Southern Oil Co. No. 1. well.

- 1 boiler
- 2. houses.

Alberta Southern Oil Co. No. 2.

- 1 boiler

Alberta Southern Refining Co.

- 2. Stills
- 1 boiler
- 4 houses.



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Southern Alberta Oil Co. No. 1.

4 houses

Southern Alberta No. 2.

1 boiler

1 blacksmith shop.

Prudential Oil Co.

1 boiler

3 houses.

1 still

1. Steam Power water pump (at deep river)

Calgary Petroleum Products Co.

3 stills

14 houses

6 boilers

3 gas engines

A plan of the gas lines is attached. Please note Mr. A. W. Hingman's letter to me which is enclosed. In this letter, Mr. Hingman indicates the several plants which were closed down when I measured the waste of residual gas and also makes a statement that all residual gas will be taken care of by spring. It would appear from Mr. Hingman's letter that the wastage of 2,223,360 cu. ft. as indicated by my measurements is not a normal condition at the plant.



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Summary of Inspection

- 11) The waste of gas at the Dingman Extraction plant is 2,223,360 cubic feet per day, according to pitot tube measurements Nov. 27.
- 12) The plant is often shut down so the above waste is not continuous.
- 13) The managing director of the Company suggests that this volume is somewhat above the normal waste.
- 14) The present closed pressure of the wells is 65 pounds (C. W. Simpson)
- 15) The original closed pressure was 215 pounds.
- 16) By calculation $\frac{2}{3}$ of the gas has already been taken from the field.
- 17) The field is not over a mile in diameter.

Suggestions for use of waste gas.

The following suggestions have been made for the utilization of the residual gas.

- 11) That the gas be turned into the Calgary Gas Company's main at a point near Okotoks.
- 12) That an independent line be run direct to Calgary from the Dingman field.
- 13) That the gas be used in the carbon black industry.
- 14) Or in some other industry.



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In regard to suggestion (1)

a pipe line to Eskotoks would be about 20 miles long. I do not know the pressures maintained on the Calgary-Bow Island line at Eskotoks but the following are the capacities of an 8" line, ~~20~~²⁵ miles long with an intake pressure of 50 pounds and with various discharge pressures.

8" line - 20 miles - cubic feet per 24 hours.

Intake pressure ---	discharge pressure ---	Capacity
50 lbs.	5 pounds	2,759,000
50 "	10 "	2,678,000
50 "	20 "	2,446,000
50 "	30 "	2,094,000
50 "	40 "	1,544,000

The ^{highest} ~~largest~~ discharge pressure that a 8" line could deliver 2,000,000 feet in Eskotoks would be 30 pounds. I imagine that the Calgary line has a much higher pressure than this and if so the Dingman gas could not be taken except by means of a costly compression plant. It might be possible for the Calgary company to modify their line pressure at Eskotoks to admit the Dingman gas ~~at~~ during certain periods of the year when the remainder of the line to Calgary is not under



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heavy load. but this would only partially solve the question ~~and~~ during the winter months ~~the~~ since during the cold weather the gas company would have to maintain ~~maintain~~ as much pressure as possible in order to deliver a maximum volume of gas to Calgary.

The cost of an 8" line would probably be in the neighborhood of two or three hundred thousand dollars.

a compression plant is out of the question

In regard to Suggestion (2).

The distance to Calgary from the field is about 50 miles. An 8" line ~~with~~ 50 miles long with an intake pressure of 50 pounds and a discharge of 5 pounds would deliver 1,740,000 cu feet per 24 hours. I presume the distribution could be made in Calgary at 5 pounds. The cost of the line would in my opinion be prohibitive for the return on the investment.

Suggestion (3).

The utilization of the gas in a carbon black plant would seem to be the easiest solution. but there is a serious objection which is, that in practically all.



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gas fields where carbon black plants have been in operation steps have been or are being taken to close them down by legislation. Plants in Wyoming have recently been closed. What I mean is that it might not be wise to establish a precedent by allowing carbon black plants to be created in the west.

In regard to suggestion (4.)

apart from an objection to be mentioned later, the distance of the wells from the railway eliminates practically all large industries.

Possibly it is no concern of the Department whether or not the gas field warrants the erection of pipe lines or industries so long as the residual gas is utilized but I wish to draw attention to some of my conclusions which if I were an operator would discourage me from expending any large sum of money in utilizing this residual gas. It is quite evident that the field is not over a square mile in area and owing to the decline in the field pressures it would appear that there is not more than half the total gas volume remaining in the field. Certainly there is very little inducement to build pipe lines costing half a million or more with the expectation of realizing on the investment.



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I would say, therefore, that the utilization of the residual gas as a supply for Calgary is practically out of the question. That the Carbon-black industry is a feasible solution but it might be unwise to allow it and that the use of the gas by any other large industry is unlikely.

Mr. Dingman states that all the gas will be taken care of in the field by spring. Let us estimate that there are 100 days until spring then if 2 000 000 per day is the rate of normal wastage, the total amount wasted, if the plant were run continuously, would be 200 000 000 cubic feet. The value of this volume cannot be estimated at 38¢ per 1000 ft as stated in the Calgary Herald - it has, of course, no cash value. However, as the residual gas has 1000 B.T.U's per cubic foot (Stott, G.S.C. Summ. 1917 - pp. 20C) the heat value of the waste gas would be 200 000 000 000 B.T.U's. Such would be a serious waste of fuel which could hardly be permitted.

Suggestion.

I herewith make the following suggestion:

That the company be allowed until the 31st of March 1920 to have all the residual gas consumed in local operations or otherwise.

That, for the purposes of standardizing and completing the extraction plant, the company be allowed to operate for 8 hours a day.



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for 5 days a week until the 31st of March.

That no gas shall be allowed to waste during periods of when not operating

That after the 31st of March the company must have made arrangements for the utilization of the total volume of the residual gas.

That the waste per hour shall not be greater at anytime than it was on Nov. 27th

The measured waste of gas is 92,640 cubic feet per hour. In 8 hours the waste would be 741,120 cubic feet and in the 60 days to the 31st of March the total waste would be 44,467,200 cubic feet. As this is less than would be wasted in ordinary drilling operations in the field (There is probably more gas wasted at the Record well now drilling) There could be no objection to this.

As I have indicated above the "Dingman Field" is not very extensive. However there is another phase of the question which should be taken into account.

Along a narrow belt in Range 2. West of the 5th Meridian extending from the Dingman field (Township 20) south into township 14 and 15 there are many definite indications in the form of gas springs and geological structure suggesting that there are opportunities in the development of several small fields similar to the Dingman field. The combined gas volume, if



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these fields were developed would I believe, be of considerable importance industrially and domestically if it were piped to the Calgary-Lethbridge branch of the C.P.R. I doubt if these small prospects will be seriously developed if the plant at the Hingman well is not allowed to complete the tests.

If my suggestion is followed there may be some difficulty for the Department to know definitely, that the company obeys orders in the number of working hours. It would possibly be advisable to station an inspector at the wells for this purpose

Your obedient servant

S. E. Slipper

Petroleum Engineer

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Marble Bldg.

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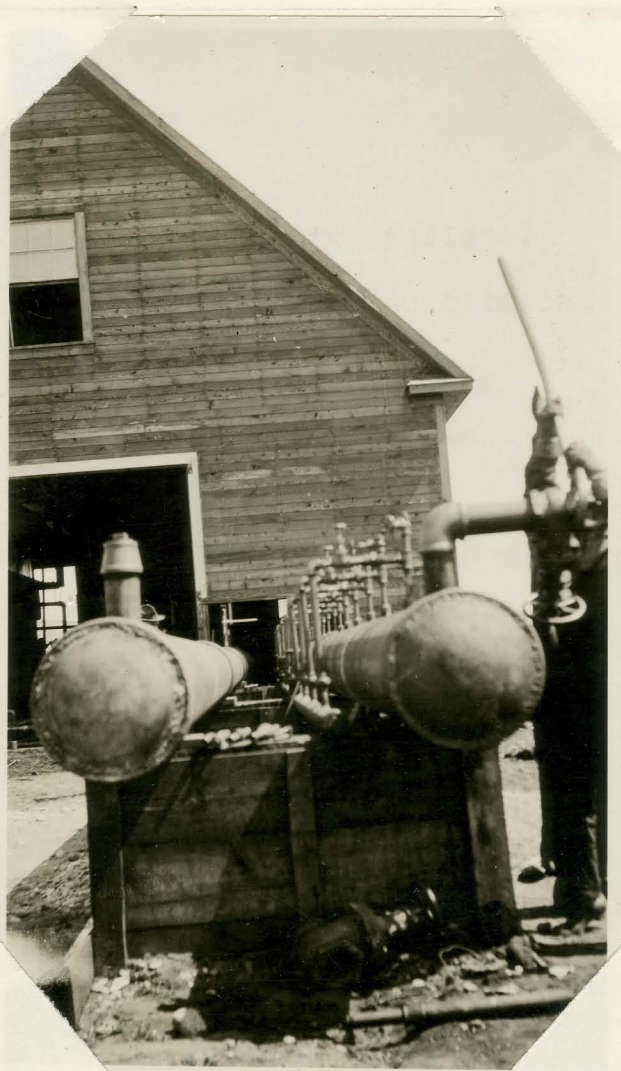
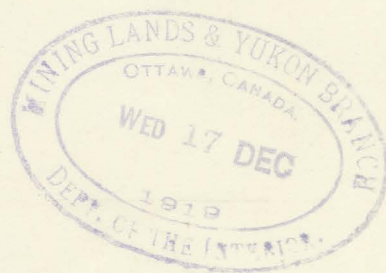


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Gasoline Extraction Plant.
View of "Spray absorbers" (under construction)

While the gas from the well is passing through the large horizontal pipes, mineral seal oil is sprayed into it from a series of sprays entering the large pipes from above. (see the absorber on right of photo.) The spray of mineral seal oil absorbs the gasoline vapor from the gas. which passes out to "vertical absorbers" and then out of the plant as residual gas.

Photos by A. M. Ringman

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Cal. Pet. Prod. Co.

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Gasoline Extraction Plant.

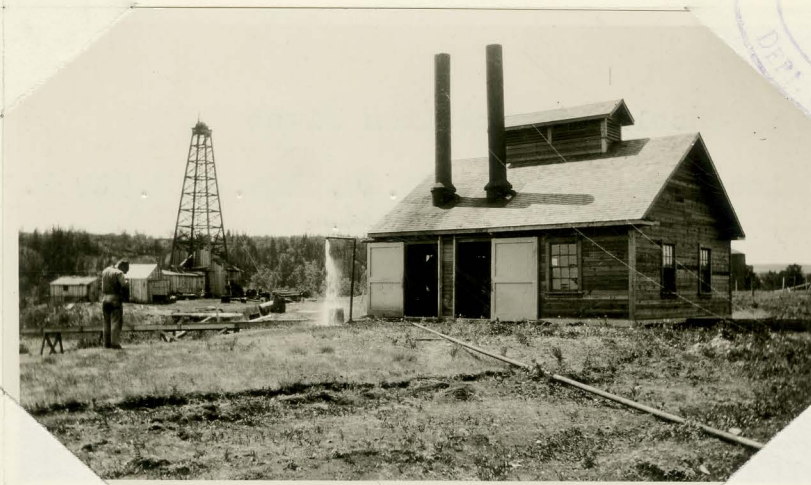
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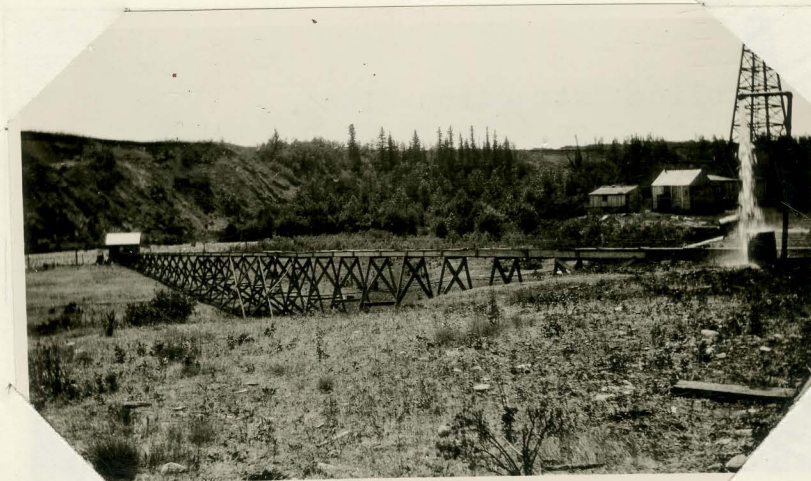
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Calgary Petroleum Products Co.
Gasoline Extraction Plant.



Power Plant.
Well No. 1. in background.



Water Supply. Equipment.



Extraction Plant in Background.

photos by A. W. Dingman

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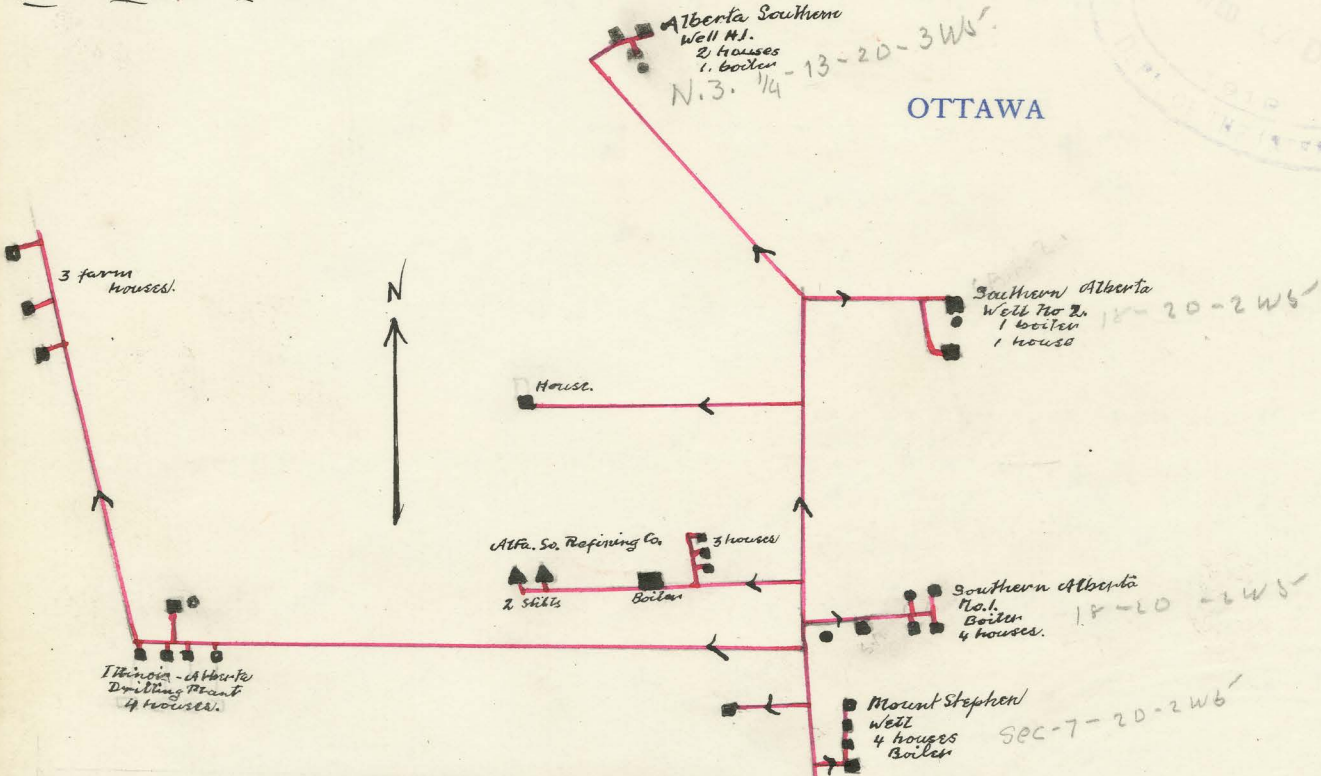


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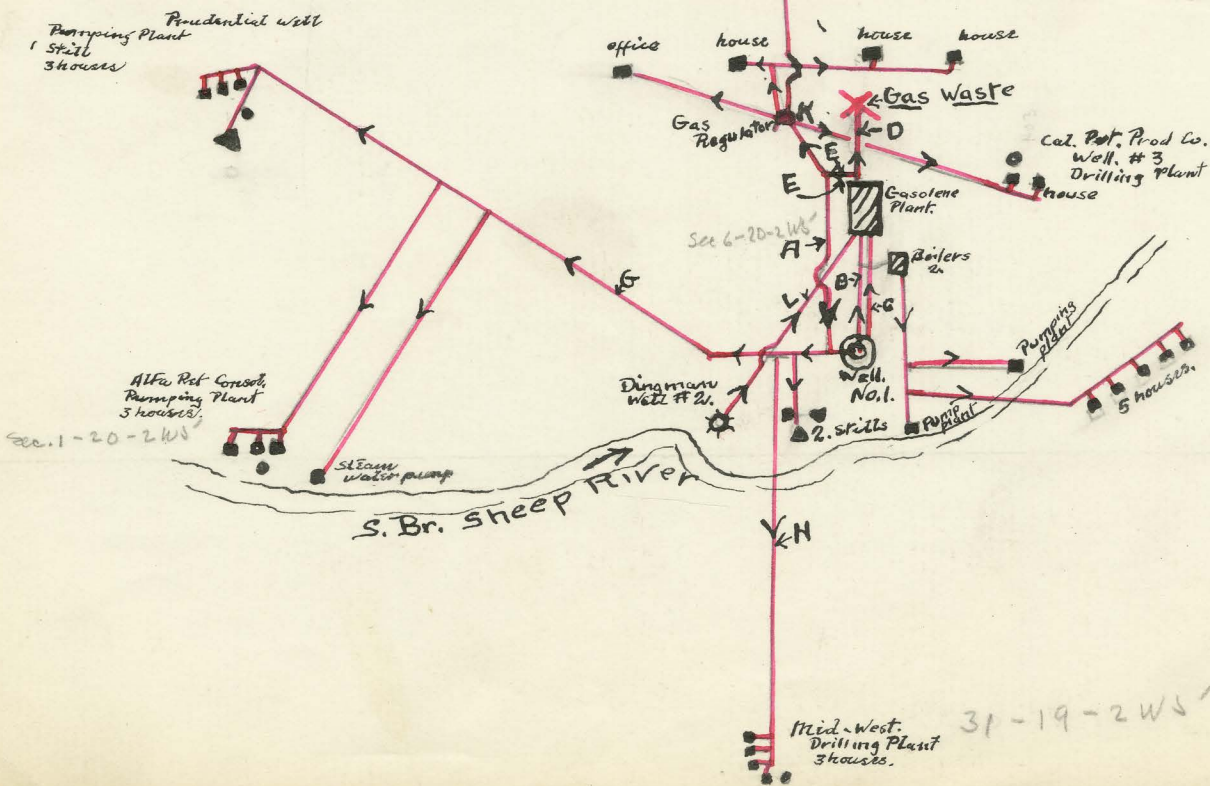
Diagram of Gas Lines - Cal. Pet. Prod. Co.
Mining Lands and Yukon Branch

not drawn to scale



When absorption plant is working the Deep gas goes to absorbers through line B. The shallow gas leaves well through line G and the gas from No. 2 through line L. The residual gas leaves the plant at 55 to 65 pounds pressure. The gas is supplied to service lines from line E. Whatever gas volume that the service line will not consume instead of going through E goes to waste through line D.

When extraction plant is shut down the consumers are supplied direct from No. 1. by gas line G running west, by line H running south and the consumers north of the well are supplied through the regulator at K, by line A. Only the Deep gas is used. No gas is wasted.



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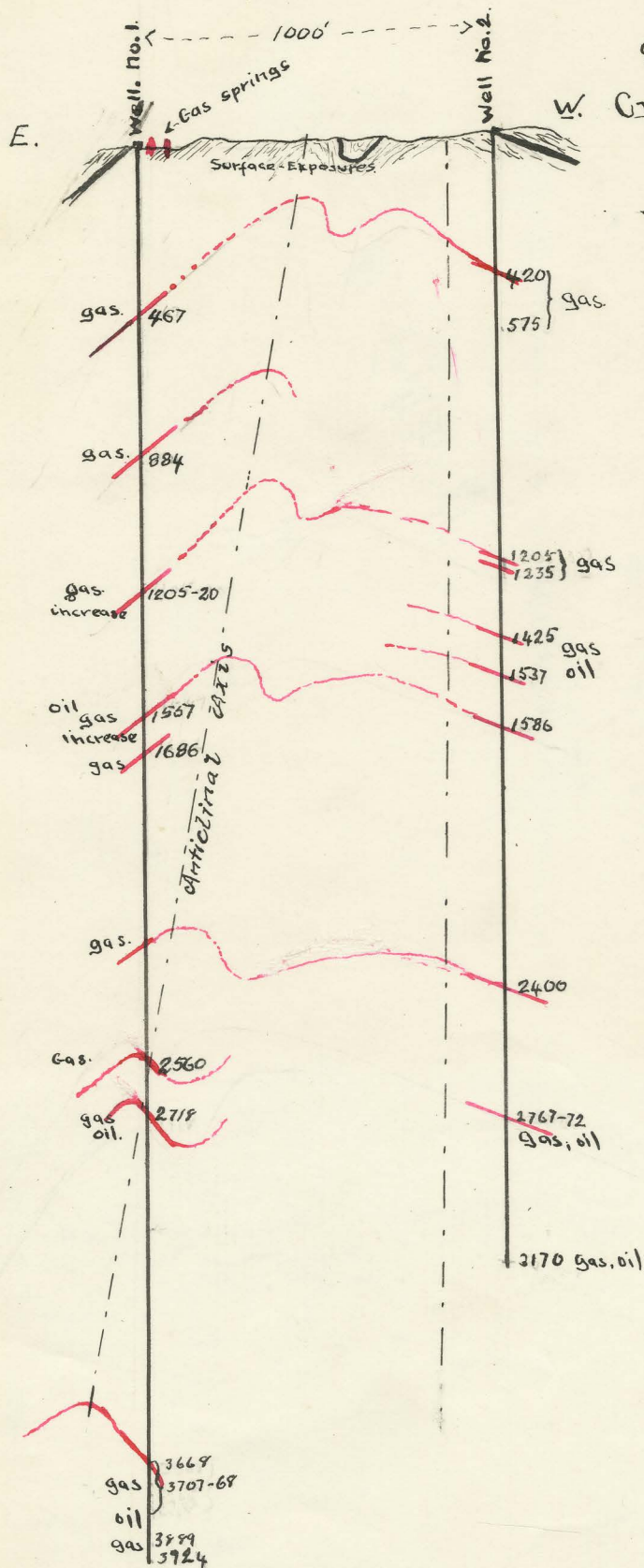
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Mining Lands and Yukon Branch
Calgary Petroleum Products Co.
Report on use of Residual Gas

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Sketch of Wells 1. and 2.

W. Cross-sectional view indicating relation of Gas Horizons.



The wells are located on the crest of the Turner Valley Anticline. The crest is not a simple fold but consists of secondary anticlines. The crests of two of these smaller folds occur between No. 1 and No. 2 which are 1000 feet apart.

Several large natural gas springs occur near No. 1. and are "fed" from the 467' band, which in turn is replenished from lower sands. It would appear that all the sands in Wells 1 and 2 derive the gas from a main gas sand which is at a much deeper level than yet penetrated by the drill-holes.

Gas is taken from two different casings at well No. 1. The "Deep gas" comes from below 2500' and the "Shallow gas" from above 1500'.

The present rock pressure is about 50 pounds.

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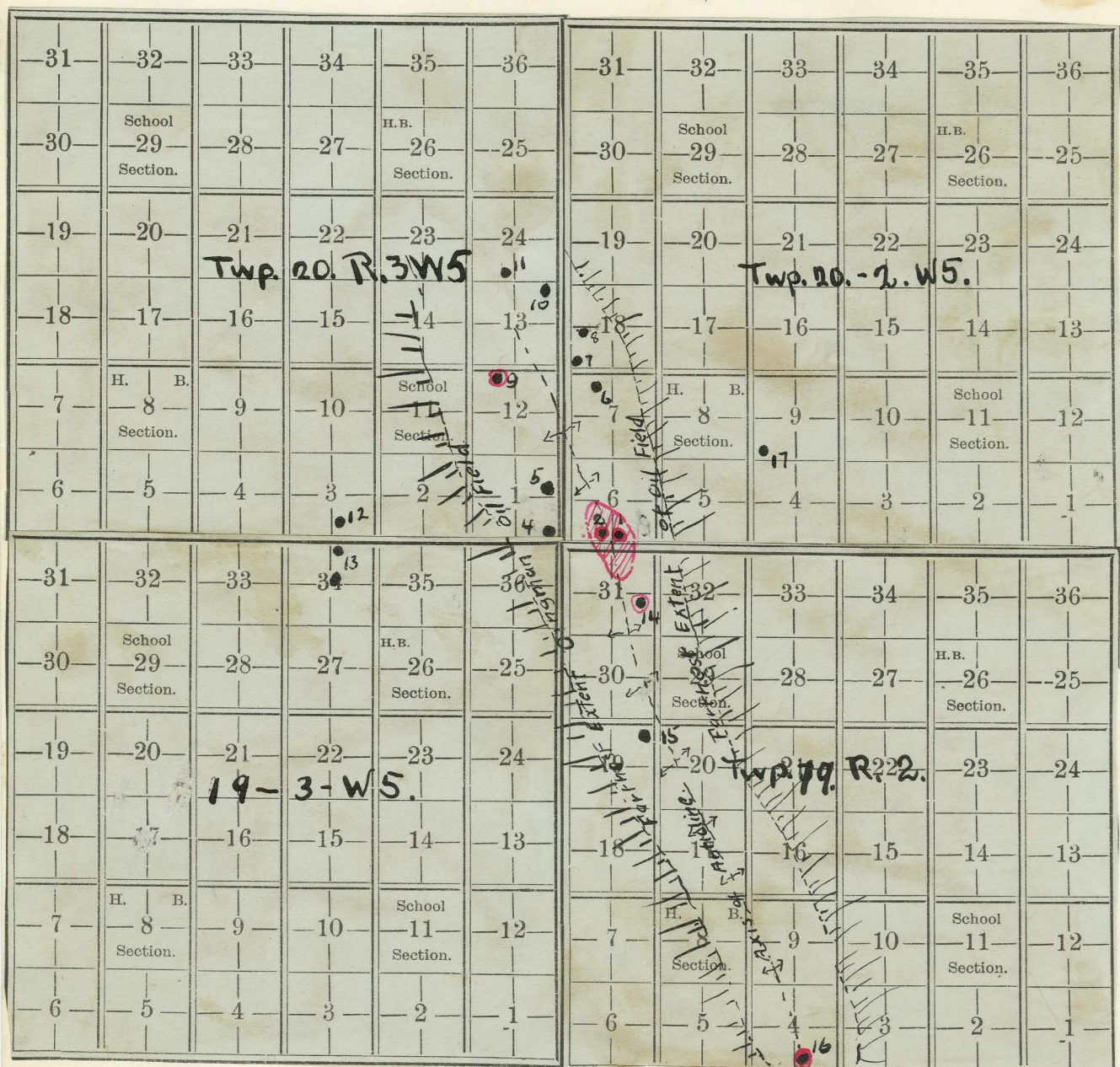


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● - Drilled well producing no gas
● - Drilled well showing gas.

Plan of Dingman Field - showing Drilled Wells and Extent of Gas Field.

1. "Dingman" Well No. 1. Gas. large volume.
2. " " No. 2. " Fair "
4. Alta. Pet. Cons. - no gas. Depth 2774'
5. "Prudential" Well - no gas.
6. Mount Stephen - no gas
9. Illinois-Alta - small flow Gas - 2200'
7. Southern-Alta - no gas - 3575'
8. " " no 2 - no gas.
10. Alta. Southern. - no gas
11. N.W. Pac. No. 1. - no gas
12. United. No. 1. - 3000' No gas.
13. Black Diamond Wells - no gas
14. Mid West. Gas in very small volume
15. G. & M. (approx location) No gas.
16. Record - gas in Fair Volume

The approximate extent of the Dingman Gas Field is outlined in red on the map.

The small unimportant flows at 14 and at 9 indicate that the gas does not extend very far along the crest of the anticline. The other wells show there is no gas on the flanks of the fold.

The gas at 16 is another accumulation. The deep well at 15 proved that it was not connected with the Dingman Field.