2, 1953



# In the Privy Council

No. 14 of 1952

## ON APPEAL

FROM THE SUPREME COURT OF ALBERTA
(APPELLATE DIVISION)

BETWEEN

MICHEAL BORYS - *(Plaintiff) Appellant*

AND

CANADIAN PACIFIC RAILWAY COMPANY and
IMPERIAL OIL LIMITED - *Defendants (Respondents)*

# RECORD OF PROCEEDINGS
# VOLUME 4

Pages 578 - 785.

CHARLES RUSSELL & CO.,
37 Norfolk, The Strand, London,
*for the Appellant.*

BLAKE & REDDEN,
17, Victoria Street, S.W.1.,
*for the Respondent*
CANADIAN PACIFIC RAILWAY COMPANY.

LAWRENCE JONES & CO.,
Winchester House, Old Broad St. London, E.C.2.,
*for the Respondent*
IMPERIAL OIL LIMITED.

4

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*for the Respondent*
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LAWRENCE JONES & CO.,
Winchester House, Old Broad St. London, E.C.2.,
*for the Respondent*
IMPERIAL OIL LIMITED.

IN THE PRIVY COUNCIL

No. 17. of 1952.

ON APPEAL FROM THE SUPREME COURT OF ALBERTA
(APPELLATE DIVISION)

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BETWEEN:

MICHEAL BORYS,

Plaintiff
(Appellant)

- and -

CANADIAN PACIFIC RAILWAY COMPANY
and IMPERIAL OIL LIMITED,

Defendants
(Respondents)

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RECORD OF PROCEEDINGS

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| 18 | Order No.1070-Certified Copy of a Report of a Committee of the Honourable the Privy Council, approved by His Excellency the Governor General in Council, | Oct.31,1887 | 113 | 786 |
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GEORGE HOMER FANCHER, having been first duly sworn, examined by Mr. Helman, testified as follows:

Q Dr. Fancher, will you just tell the Court who you are and what education you have had? A. Yes, sir. I was born in San Francisco, California. I grew up in the oil regions of the Los Angeles basin, attended primary and secondary schools there and was graduated from the University of Southern California with the degree of B.S. in 1923.

Q I think you can sit down, Dr. Fancher, the way the other witnesses did.

Q THE COURT: Certainly. Just speak loudly enough so that the man in the far corner of the room can hear you. A. Yes, sir.

Q MR. HELMAN: You got as far as your B.S.

A Yes. Following graduation from the University of Southern California, I worked for two years in the oil fields of Southern California, and then in 1925 I went East to undertake graduate work. I have done graduate work at the University of Maryland, the University of Michigan and the Colorado School of Mines. And during those pursuits was awarded the degrees of Master of Science in Chemical Engineering and Doctor of Science in Petroleum Engineering.

I have worked at various times in the oil fields of California, Pennsylvania, Kansas and Oklahoma.

I have also had many years of service as a teacher. While a graduate student, I have served as a Teaching Fellow in Chemical Engineering at the University of Maryland, I was a Teaching Fellow or assisted in Chemical Engineering at the University of Michigan, and I have an American Petroleum Institute research fellowship at the University of Michigan. These activities took place in the years 1925 to 19--, through 1928, at least for the scholastic year. At the Colorado School of Mines I was respectively Instructor in Petroleum Engineering, and an assistant and Associate Professor of Petroleum Engineering.

In 1931 I became an Assistant Professor in Petroleum Enginering at the Pennsylvania State College. And in 1936 and up to the present time

I have been a Professor of Petroleum Engineering at the University of Texas. Since last January of this year, I have also been director of the Texas Petroleum Research Institute.

In summertimes and at various other times, I have been a consultant to many oil companies in the United States, working always in this capacity on petroleum production problems, particularly those dealing with efficient recovery of petroleum. During the summers of 1948 and 1949, I was in South America, where I was a consultant to the National Petroleum Council of the Republic of Colombia. My appointment was by Presidential decree.

In 1948 at the time of the Atlantic No. 3 blowout here, I was asked by the Conservation Board of Alberta, the Petroleum and Natural Gas Conservation Board, to come here and visit the site of that disaster, and discuss the problem with them and so forth, and I was here a few days at that time.

Q Are you going on from there? A. Well, this is quite an obituary. I am a member of the Amercian Chemical Society, a member of the American Institute of Mining and Metallurgical Engineers, and for the past few years I have been Vice-Chairman of the Gulf Coast section. I am a Fellow of the Institute of Petroleum, which is a British organization. I am a Fellow of the Texas Academy of Science. I am a member at the present time of the Executive Committee of the Central Committee on Drilling and Production Practices of the American Petroleum Institute. That is the committee to which all working committees in the Production Division of the Institute report.

I have been for many years, in fact since it was organized, a member of the American Petroleum Institute Committee on A.P.I. Code 27, which is the measurement of permeability, and have been for I don't know how many years Chairman of that committee.

I am a member of the American Petroleum Institute Committee on Secondary Recovery, and Chairman of the Committee for the

Southwestern District, which includes our Southwest oil producing States.

I am a member of the American Petroleum Institute Committee on Drilling Fluids, a Committee on Core Analyses and Well Locating.

I have been a member of the Advisory Committee on Secondary Recovery to the Interstate Oil Compact Committee from the time that committee was appointed to the present time.

While at the Pennsylvania State College I had the privilege of initiating the research programme on production problems, particularly those dealing with efficient recovery of petroleum. It was this research work which, in some measure, at least, developed the early work on core analysis and made possible the measurement of permeability, a programme of research which has been continued by that college and is now, I believe, nationally, if not internationally, known.

I also had the privilege of undertaking pioneer work in water flooding in Kansas during the years 1934 to 1935. That was interesting work because the Statutes of Kansas had to be changed before that work could be undertaken, and this first project which our company put in has led to a rather remarkable increase in recovery of oil from the Eastern portion of that State.

I might also add that I am a registered Professional Engineer of Texas and of Alberta too.

Q Now, have you been called in to give evidence on other occasions as an expert, Dr. Fancher? A. Yes, sir. I believe I stated that I had served as a consultant to companies. I have appeared from time to time before our Railroad Commission of Texas, which has the job of administering the conservation in Texas, and I have, as I have said, worked with the Interstate Oil Compact Commission. I have also appeared as a witness at several hearings of the Federal Power Commission in their investigation into the Natural Gas Industry a few years ago.

Q Now, Dr. Fancher, the C.P.R. . . . A. Excuse me, I might also say that I have appeared before the Arkansas Oil and Gas Commission.

Q The C.P.R. asked you to prepare, or, first of all, I asked you to prepare a list of the various articles which you have written on problems, different problems related to the oil and gas industry? A. Yes, sir.

Q Have you got that list here with you? A. Yes, sir. I have a list which is correct up to 1950.

MR. HELMAN: I thought perhaps rather than have your lordship listen to the various articles, which are many, that the witness has written, that I would just file this as an exhibit.

THE COURT: Any objection, Mr. Steer?

MR. STEER: No, my lord.

THE COURT: It will be Exhibit 121.

LIST OF PUBLICATIONS OF DR. FANCHER MARKED EXHIBIT 121.

Q MR. HELMAN: Now, Dr. Fancher, the C.P.R. asked you to prepare a report with relation to some of the problems involved in this litigation, and you have prepared such a report? A. Yes, sir.

MR. HELMAN: I would like to have it marked as an exhibit, my lord, and have the witness read it to your lordship.

THE COURT: Any objection?

MR. STEER: None, my lord.

THE COURT: Except subject to the usual objections?

MR. STEER: Oh, yes, my lord.

THE COURT: Exhibit 122.

BRIEF OF DR. FANCHER MARKED EXHIBIT 122.

Q MR. HELMAN: Will you proceed with your brief, Dr. Fancher? A. Beginning with the manuscript, the title selected was "The Relation of the Meaning of the Word Petroleum to the Production of Oil and Natural Gas." 1. The Word "Petroleum".

"The word 'Petroleum' was coined by someone in the now-forgotten past from the Greek words 'petra' (rock) and 'oleum' (oil), and literally means 'rock oil', and probably was devised to apply to a natural seepage, i.e., an 'oil spring'.

"The Romans did not use the word 'petroleum', applying the name 'bitumen' to the various descriptions of natural hydrocarbons; the work petroleum never being found in classical Latin.

In English, the word "petroleum' was used for shale oil and similar rock oils long before the drilling of the first oil well in 1859."

I might remark that we do not consider the shale oils of England and Scotland, which are prepared by distillation, to be petroleum, certainly in the usual sense of the word.

"The word was used in England in various senses in ancient times, and was applied especially to shale oil at least as early as the middle of the 14th century."

Again parenthetically I might say that I noticed one use of the word in early English literature, and it did not mean oil at all, it referred to a sort of rock.

The word "petroleum", in a technical sense, is a broad term, defined, in substance, as a mixture of naturally occurring hydrocarbons in great variety which may assume the gaseous, liquid, semi-solid, or solid state, depending upon conditions. The exact physical state or form depends upon the composition of the particular mixture, the temperature and the pressure. The petroleum gases and liquids interchange their forms readily, depending only on variable conditions of temperature and pressure. Consequently, the single word "petroleum" is indicative of a substance which always is a mixture of hydrocarbons but is indefinite with respect to the physical state of the mixture. The words "crude oil", or, where context is clear, simply the word "oil", designate the liquid state for such a mixture; whereas the words "natural gas" clearly means the gaseous state for a mixture of hydrocarbons.

There is no definite chemical dividing line between natural gas, natural gasoline, crude oil, gasoline and other oils of commerce except that introduced by cracking and certain other refining processes in the manufacture of products. All are composed of substantially identical natural hydro-

carbon compounds. These compounds consist of methane, ethane, propane, butane, pentane, hexane, heptane, octane, and higher hydrocarbons. Natural gasoline, for example, usually contains a larger percentage of the lighter hydrocarbons than straight run gasoline, but all are present.

A study of the literature on petroleum, including oil, gas, and related systems of hydrocarbons, from earliest times to 1950, and ranging from casual references to complete treatises, naturally discloses apparent disagreement as to the meaning and shades of meaning of the word "petroleum", particularly to those who know little of the petroleum industry. However, it must be emphasized that the usage of any word depends upon the background of the user. Fortunately, the word "petroleum" is a technical term, and hence is used more precisely by the technologist and less precisely by the relatively less well informed. Consequently, technologists concerned chiefly with the occurrence of systems of natural hydrocarbons, their discovery, production and exploitation, early found that petroleum in its liquid and gaseous forms had a common origin and composition and, consequently, used the word "petroleum" frequently in a generic sense instead of the literal meaning based upon the origin of the word. Many writers specifically state that petroleum includes natural gas. Many others employ "petroleum" as a title covering a discussion of oil and natural gas.

Q Now, Dr. Fancher, you have some material that you thought would be appropriate to refer to at this stage? A. Yes, sir.

Q Will you tell us what that is? A. One thing which I have here is a photostatic copy or reproduction of Part II of the Report on the Oil and Gas Regions from the 1886 volume of the second Geological Survey of Pennsylvania. This is one of the Annual Reports. The author of the report proper is John F. Carll, a geologist in the employ of the Geological Survey of Pennsylvania. And the title page states that this is a report on the Oil and Gas Regions, names the author, and the sub-head states that there is also a report on the composition and fuel value of natural gas by a co-author, Francis C. Phillips, and also the volume contains a list of the publications relating to petroleum, according to this title.

Q In a word, this is a bibliography of various publications that are attached to the report to which it refers? A. Yes, sir. I was particularly interested in the bibliography on petroleum, and it really is a remarkable bibliography, because there are some 65 pages which indicate the considerable knowledge that could be had about petroleum and that was available to those who could read in the year 1886. And in this bibliography there are numerous references, according to title, to the various words that we have been using here, namely, to the gas and the solid constituents of petroleum, such as ozocerite and asphalt, as well as to the more conventional words such as petroleum and oil and so on.

Q I just wanted to stop you for a moment and to emphasize, if I may, that on the outside it says that it is a list of publications relating to petroleum? A. Yes, sir, that is the title of the bibliography.

Q And then when you go to the bibliography we find that it deals with these various writings, and I think it goes from page 831 to 895 of closely printed matter. Would you pick out some of the titles that you think might be of interest as showing the state of knowledge with regard to various subject matters in 1886, and also as to whether or not gas was included in petroleum? A. Yes, sir. I have marked a number here that would seem to be of special interest in this bibliography. I am just looking at the titles I have.

MR. HELMAN: I am going to mark this as an exhibit, and I thought your lordship would like to look at it.

MR. STEER: Could we have a copy?

THE COURT: You do not want it marked this morning?

MR. HELMAN: No, after the witness is through reading I might mark it. Perhaps we had better mark it now, and then we will have it before your lordship and we can pick out parts of it.

THE COURT: Has anyone any objection to this annual report, the Geological Survey of Pennsylvania, 1886, Part II, Report on the Oil and Gas Regions by John F. Carll?

MR. STEER: I make the formal objection, my lord, that we are not interested in United States reports and United States terminology; what we are interested in is Alberta.

MR. NOLAN: What part of Alberta?

THE COURT: Well, we have already spent a lot of time, and I do not see that it can do any harm to put this one in with all the others.
MR. STEER: Yes, my lord.
THE COURT: All right, Exhibit 123.

ANNUAL REPORT, GEOLOGICAL SURVEY OF PENNSYLVANIA, 1886, MARKED EXHIBIT 123.

Q MR. HELMAN: Well, are there any titles which you would like to bring to our attention on page 831? A. Excuse me, sir.
Q Yes? A. I would like to make another comment.
Q Yes, go ahead. A. I would like to call attention to the forenote on page 828 that this is, or I would like to call attention to the forenote on that page for this bibliography of petroleum. You will notice that acknowledgement is made to several authorities who had done some work.

"Mr. B. S. Lyman, geologist, appointed by the British Government to report on the Oil Fields of the Punjab, in Upper India, and afterwards a Director of the Geological Survey of Japan, prepared a Bibliography of Petroleum in 1875, which he presented to the Geological Survey of Pennsylvania. Professor S. F. Peckham, Special Agent for reporting on Petroleum and its Products to the Bureau of the United States Census, of 1880, requested and obtained permission to use Mr. Lyman's list in the preparation of a more complete Bibliography brought up to the date of the publication of his report."

And also an acknowledgement is made by Professor Peckham to Professor Paul Schweitzer, of the University of Missouri, and then the joint work of these various men was contained in this bibliography, published in this volume by Carll, so that it has quite an international flavour.

Q Yes? A. Now, on page 830 I might also call attention to the fact that this Bibliography is quite useful in that it is chronologically arranged, and appears alphabetically within the years. The very first item in the Bibliography is entitled, "Gas in Karamania." On page 832 we have an article by S. Turner, published in 1800, which has the title of "Chittagong Oil Gas."

I believe I neglected to mention that the first article was 450 plus or minus B.C.

Q What is the date of the last one? A. The last one is 1800.

MR. STEER: Well, if we get along as fast as that in this it will be all right.

A Pardon Me?

Q Excuse me, Dr. Fancher. If you pass from 450 B.C. to 1800 as quickly as that it is pretty fast progress.

A On page 833 you will find an article on "Gas in Karamania" by Beaufort, dated 1820.

On page 835 we have an article by J. F. Davis, dated 1836, entitled "Mud volcanoes and gas in China." On page 837 we have an article by Selligue in 1840 on a new process for making gas for illumination from bituminous schists.

On page 838 we have an article by Vigne in 1842, titled "Jewala Muki gas." I may not be pronouncing these correctly. On the same page an article by Klaproth, in 1843, entitled "Fire wells in China and bamboo gas tubes at Khiungtschen."

At the top of page 839 we have an article by Humboldt, published in 1845, and the title is in German, it is "Dampf-und Gasquellen" and so on, which, I take it, means gas.

On page 845 . . .

THE COURT: Well, Mr. Helman, the witness is going to refer to a great many of these, I presume. I was wondering if it would not be possible tonight to make out a list and have the list put in and distributed among the counsel?

MR. HELMAN: Yes, that could be done, my lord.

THE COURT: It would save us quite a lot of time.

MR. HELMAN: Thanks very much, my lord.

THE COURT: You would like to put it in as an exhibit, I presume?

MR. HELMAN: Yes, my lord, I will put it in as an exhibit and I will try to get it typed tonight. If not, at the latest tomorrow morning. I

will get it prepared tonight.
THE COURT: I will put in a blank number for it. Exhibit 124.
THE WITNESS: Could I say something, please?
THE COURT: Yes. Perhaps you do not want to do it that way, and if you do not, say so.
A There are two points to be noted about the material I am calling special attention here to. One is that in this Bibliography of Petroleum, the rather numerous references to gas and the other is that there is considerable literature in Canada, and we have not come to an instance of those yet, but we shall
Q Suppose tonight you make out a list and we will mark it as Exhibit 124, and then you pick out of that long list what you want to make reference to. There will be a great many of them to which you wouldn't want to make special reference, but there will be a number that you will like to make special reference to. A. Yes.
Q And then tomorrow forenoon or tomorrow morning mark those to which you would like to make special reference, and then jump all the rest. Wouldn't that serve the purpose?
MR. HELMAN: Or I could have the witness, and it is not likely to mutilate the exhibit, but I was going to have him mark it on the exhibit.
THE COURT: That will be all right, to mark the exhibit. It will show clearly, that is Exhibit 123, which shows clearly that portion to which the witness is referring. I see no objection to that.
MR. HELMAN: The only thing is that I do not know that it will do as well for my friends as if I had the separate list made from it, so that on second thought, I will get a list made out tonight and Mr. Steer will know to which we are drawing attention, otherwise he would have to examine the exhibit itself.
THE COURT: That is true. All right, we will reserve number 124 for this list.
Q MR. HELMAN: Now, have you any other literature to which you want to make reference at this stage? A. Yes, sir. I have here a photostatic copy of three pages from a book titled "The Oil-Well Driller." This book is by Charles A. Whiteshot, and was published in 1905 in West Virginia.

The second page of this

photostatic copy of the page from this publication is an outline table showing the oil and natural gas producing sands in North America, and it says further,

"Generalized vertical section showing the various stratas and names used in the descending order in North America that are known to contain petroleum-oil and natural gas beginning at the top of the soil at the South Penn Oil Companies Well No. 17,"

and so on.

The specific title of the pages is "Oil and Natural Gas Horizons" and it is a tabulation much like the one Mr. Gustafson introduced the other day in this case showing the generalized geologic section in this area. Only this purports to do it for North America in the light of what was known in 1905. I might further remark that Mr. Whiteshot was not a technical man but, rather, a newspaper writer.

Then also is reproduced from this book page 122, several paragraphs which are titled "Oil and Gas Lease as it is Written at the Present Day." The first paragraph reads as follows:

"This lease, made this fourth day of January, A.D. 1905, . . ."

and then I will not repeat the names of the men involved. The rest of the paragraph goes on, and then I want to call attention to the second paragraph in this lease, to line 9, line 9 in the second paragraph of the lease, and perhaps I had better read line 8, and after the usual legal preamble in this sentence it says:

". . . for the sole and only purpose of drilling and operating for petroleum oil and gas, for the term of five years . . ."

and that is the end of the quotation that I want to call attention to, and I want to call attention to the fact that "petroleum" modifies the noun "gas" as well as "oil".

Q MR. STEER: With the word "and" in between? A. Yes, sir. There is no comma or other mark of punctuation.

MR. HELMAN: I tender that as an exhibit.

THE COURT: Exhibit 125.

PHOTOSTATIC COPY FROM THE OIL-WELL DRILLER MARKED EXHIBIT 125.

Q MR. HELMAN: Will you just proceed, Dr. Fancher? A. Continuing on page 3.

As the petroleum industry developed rapidly during the past thirty-odd years, technologists were needed. Consequently, universities and colleges provided courses and curricula for the training of the specialists required. Department of Petroleum Engineering were organized in many of the schools. The curricula of all these departments - I think I am reasonably well acquainted with them - includes work on natural gas in recognition of the fact that natural gas is a component of petroleum. Professors of Petroleum Engineering teach courses relating to natural gas. I, myself, as Professor of Petroleum Engineering, at the University of Texas, have for many years taught a course designated as Natural Gas Engineering - and that requires of all students at the University of Texas to receive the degree of Bachelor of Science in Petroleum Engineering - which deals with the problems relating to the handling of natural gas in the production of oil. In the United States thirteen curricula in Petroleum Engineering in as many universities and colleges have been approved and accredited by the Engineers' Council of Professional Development in 1950. Petroleum Engineering may be said to be the science of the extraction of petroleum, including natural gas as well as petroleum liquids, from the natural petroleum reservoirs. Consequently, a Petroleum Engineer is one who has studied and applied the science of petroleum engineering.

Likewise, trade associations and technical societies were organized in response to the needs of the petroleum industry. Well-known examples include the Institute of Petroleum in Great Britain, the American Petroleum Institute, and the Petroleum Division of the American Institute of Mining and Metallurgical Engineers in the United States.

The Journal of the Institute of Petroleum always has devoted space and attention generously to natural gas as well as oil. A feature of the Journal is the excellent section of abstracts covering the literature on oil and natural gas throughout the world. The American Petroleum Institute is especially distinguished for work accomplished through its

many committees in the preparation of codes, specifications and standards. The American Petroleum Institute has a "Standard Committee on Measuring, Sampling and Testing of Natural Gas and Natural Gasoline". Likewise, a variety of papers on natural gas have been presented before the Institute and are available in its publications. The publications of the Petroleum Division of the A.I.M.E. include many papers on various phases of the actual production and handling of natural gas as well as statistics on both oil and natural gas.

The use of the word "petroleum" in a corporate name is common. The Phillips Petroleum Company, the General Petroleum Company, and many others illustrate the point. Each of these companies has a natural gas department to deal with the problems peculiar to this form of petroleum.

The components of petroleum oil and gas, their production and the manufacture of petroleum products, have been and are the subject of intense research by scientists and engineers since the birth of the petroleum industry in 1859. Consequently, the petroleum industry is characterized by an advancing science or technology in which, as a result of scientific study, many conceptions have been changed and altered as knowledge is gained. For example, what at one time could be and was designated "casing-head gasoline" now is termed "natural gasoline". What used to be called simply "oil" and "salt water" and "natural gas", when referring to the content of the petroleum reservoir, now is known as "reservoir fluid". The term "crude petroleum" is considered to be broader and more inclusive than "crude oil". Moreover, "crude petroleum" is considered to be the total hydrocarbon substance in the reservoir.

Clearly, the references in the literature and to the organization of the petroleum industry illustrate the evolution in exact meaning of the words "petroleum", "natural gas", "oil", "crude oil", and "crude petroleum" as research progressed and the science of production developed. They clearly illustrate also the confusion in meaning even now and that prevailing in 1906 and prior to 1906. They also clearly illustrate that the evolution in meaning

is one of detail and not one of kind. They prove that prior to 1906, the co-existence of natural gas and oil in the same reservoir was known; that the composition of both oil and natural gas was understood; that each was comprised chiefly of hydrocarbons; and that some authorities correctly defined petroleum as including both oil and gas. Consequently, a careful author of 1906, as today, in defining petroleum, includes the hydrocarbon in gaseous form with the liquid oils and solid minerals. Nevertheless, many authors then as now, completely forget the definition once it is made and sometimes employ the word "petroleum" to mean oil alone, even after defining petroleum correctly. Certainly, in English, if we wish to employ only one word to indicate the naturally occurring hydrocarbons of all kinds, (natural gas, crude oil, and bitumin minerals), the only word available is "petroleum".

2. The Composition of Petroleum.

The members of the paraffin series occur extensively in natural gas, crude oil, and mineral waxes. Natural gas usually contains large quantities of methane (50 to 99 per cent) and ethane (perhaps from 10 to 20 per cent) as well as smaller quantities of propane, butane, and other hydrocarbons. Gasoline and kerosene consist mainly of paraffin hydrocarbons, although members of other hydrocarbon families are found in these products and increasingly in the heavier, less volatile products of petroleum. Ozocerite consists of solid paraffin hydrocarbons.

Water invariably is found dissolved in crude oil or in an emulsified condition and in natural gas as vapor to the point of saturation.

Some sulphur occurs in all petroleum, generally in one of three forms as:

(1) free sulphur in solution
(2) hydrogen sulphide
(3) complex organic compounds

Free sulphur has been found in the crude oils from Texas, California and Roumania. Many crude oils are saturated with hydrogen sulphide. Natural gas in the

Persian oil fields contains 12 to 13 per cent of hydrogen sulphide. The gas in the McKamie Field of Arkansas contains nearly 10 per cent of hydrogen sulphide.

Nitrogen bases are found in many crude oils and free nitrogen occurs sometimes in natural gas to the extent of 5 to 10 per cent or more.

Carbon dioxide usually is present in natural gas in amounts from a trace to nearly 100 per cent in a few wells in the Rocky Mountains and in California.

I did not refer here to the, I do not believe, to the presence of helium in some natural gases, and it is a rather curious and interesting thing that Count Zeppelin before 1900 was experimenting to such an extent with heavier than air aircraft, that there was considerable interest in the gases that could be used for this purpose. He, as you know, used hydrogen, which is a terribly explosive gas. We have had many examples of disaster in the use of that gas, and there was a considerable interest in a substitute for hydrogen. One that aroused interest in the decade when interest began to grow in this as Zeppelin was doing his work in the first decade of this century, was helium, which, at first, was a very rare constituent. Its name indicates that it was recognized first in the sun, and this gas, this remarkable gas was found to be contained in some petroleum gases in this first decade, as I recall, and the early workers who called attention to that were David McFarland and Dr. Kedzie of the Department of Chemistry of the University of Kansas. I had the privilege of knowing Dr. McFarland over at the Pennsylvania State College and he has told me of his early work in this line, and he has a publication with regard to it, I do not recall the exact date, but it is about this period, with reference to the isolation of helium in natural gas. And then there was Zeppelin's work on the well-known inflammability of helium. Helium as you know, has an element, or is an e. ement, which is characterized in the chemistry books as an innert gas. In other words, it does not react with anything. It possesses about 96% of the lifting power of hydrogen, and its isolation was widely publicized, and I would not be surprised at all if it might not have led sometimes to a more

explicit definition in titles and reservations, and I do know that there is literature that there was a search in Canada for helium along sometime in the period of, perhaps a little before 1910 and up to May 1920, and I think that can be documented.

Q Well, what you are trying to tell us, Dr. Fancher, is that the finding of helium may have brought about a change in the use of language with regard to natural gas? A. Well, I know that no greater incentive or I know of no greater incentive to be reflected immediately in legal documents than a little multiplication of prices per unit times quantity, and helium, so very rare, was found in natural gas, and there was an intense search for it.

Q I think you are at page 7, Dr. Fancher, right at the beginning of line 6. A. It is somewhat like the interest in uranium now.

Q Yes? A. The amount of inorganic matter found in petroleum is relatively small compared to that found in other fuels. The fact is that we usually forget that there is inorganic matter in petroleum, and yet the crude petroleum that is produced from the earth and is separated in the field contains a multitude of substances. It, of course, is useful economically chiefly for the hydrocarbon content. A variety of elements has been reported from the ash of crude oil and asphalt. Some of the more common elements found include iron, aluminum, calcium, phosphorous, magnesium, silicon, copper, vanadium, nickel, lead, gold and sodium. These contamin nts probably come from the rocks or the sea water which always is associated with petroleum.

And then I come to the Origin and Occurrence of Petroleum.

Q MR. HELMAN: Yes. A. History prior to 1900. The nature of petroleum and the phenomena of its occurrence have stimulated the imagination since ancient times. Aeschylus had a theory of origin and many other theories have been proposed since his time to explain the origin of petroleum. The origin of petroleum is both a chemical and a geological problem, of fundamental importance to the petroleum geologist. Theories of the origin, accumulation and occurrence of petroleum are a part of petroleum geology and represent research and intellectual effort on the part of scholars in many branches of science.

The geology of petroleum had its beginning as a science long before the commercial production of petroleum began in North America in 1859. Haquet suggested in 1790 that petroleum came directly from organic matter such as mussels. Sir William Logan, director of the Geological Survey of Canada, in 1846, reported that the oil seepages on the hills at Gaspe, near the mouth of the St. Lawrence River, were on anticlines.

Geologists became interested in the causes of accumulation of petroleum within a few months after the completion of the Drake well, August 29, 1859. A professor in the University of Glasgow, Henry D. Rodgers, made the observation in 1860 that the recently discovered accumulations of petroleum in Pennsylvania were associated with anticlinal axes. Rodgers was familiar with the geology of the producing area, having spent several years in Pennsylvania making a geological survey of that state. A year later the anticlinal theory was stated clearly for the first time by T. Sterry Hunt, in a lecture at Montreal, which was published in the Montreal Gazette of March 1, 1861.

In the fields of Petroleum Engineering and Geology we pay great tribute to that great Canadian geologist, T. Sterry Hunt, who laid down very clearly the theories of anticline, what we know perhaps somewhat inexactly as anticlinal theory. The theory in brief means that in structural features such as anticlines are reservoir fluids, such as oil, and the petroleum liquids and the petroleum gasses separate according to their density, and the conception of that theory must have implied that he knew pretty well that petroleum was a complex mixture which included the gaseous phase as well as the liquid.

A paper published later in the same year provides a more detailed discussion of his ideas. His theory on the origin, accumulation, and occurrence of petroleum has been changed only by improvement and advancement, in detail rather than in principle, during the past 89 years.

During the same year of 1861, E. B. Andrews, a professor of geology at Marietta College, Ohio, pointed out the occurrence of oil and gas along the

axes of anticlines in Ohio and West Virginia. He described oil springs and oil and gas wells on the anticlines. Professor Alexander Winchell, of the University of Michigan, already had suggested, in 1860, that sandstones themselves were sufficiently porous to contain oil. I. C. White apparently was the first geologist to demonstrate the truth of the anticlinal theory for the accumulation of oil and gas by going into the field and making successful locations of wells on anticlines. He located the Graveville, Belleron and Washington oil fields in Pennsylvania on anticlinal axes and reported his success in 1885 in an article entitled "The Geology of Natural Gas."

The theories which had been advanced by chemists and geologists to account for the origin of oil and gas were reviewed by Edward Orton in the first comprehensive paper on this subject in 1888. In his summary he stated that:

(1) petroleum is derived from organic matter;
(2) it is much more largely derived from vegetable than from animal matter;
(3) petroleum of the Pennsylvania type is derived from the organic matter of bituminous shales and is of vegetable origin;
(4) petroleum of the Canada type, - he means that was known at the time,- is derived from limestones and probably is of animal origin;
(5) petroleum has been produced at normal rock temperatures (in Ohio fields) and is not a product of the destructive distillation of bituminous shales; and
(6) the stock of petroleum in the rocks of the earth's crust already is virtually complete.

Orton also reviewed the literature on petroleum reservoirs (oil and gas) in the same report. He discussed both the sandstones and limestones reservoirs of Pennsylvania and Ohio. He emphasized that oil and gas are always concentrated in the uppermost beds of limestone strata,- of course, he meant in those particular fields with which he was familiar,-and that a brine of unusual character is found at a level below but somewhat near the oil. He reported the segregation of oil, gas and water into definite zones in the Bradford sand of Pennsylvania, the gas occurring in the highest and the salt water in

the lowest levels. He therefore concluded that the entire rock is permeable and that the various fluids have been differentiated under the influence of gravity.

This brief history of the progress in scientific thought following the genesis of the petroleum industry demonstrates that by 1900 the theory of the origin, accumulation and occurrence of petroleum was in all major respects exactly as it is today. The vast amount of research, intellectual effort and fact finding since 1900 has simply verified and strengthened the early idea. Consequently, by 1900 petroleum was known to be comprised chiefly of hydrocarbons; oil and gas were known to be of common origin and intimate occurrence; petroleum geology had developed into a science and oil companies employed geologists to put theory into practice in the never ceasing search for oil and gas.

THE COURT: I think we will stop here for a few minutes. We will adjourn until exactly 4:00 o'clock.

(Hearing resumed after short adjournment.)

THE COURT: All right, Mr. Helman.

Q MR. HELMAN: You were at page 10, the second last line, Dr. Fancher. Will you please go on.

A B. Status of Theory in 1950.

ORIGIN: The origin of petroleum is one of the most important and difficult of the unsettled problems of petroleum geology. It has not yet been possible to determine the exact source bed from which any particular petroleum originated. Consequently, many theories have been proposed. They may be divided into two groups, the inorganic and the organic. The former is falling into disrepute and the majority of geologists today give credence to the organic theory despite the fact that many problems as to detail remain unsolved. The organic theory is simply that petroleum is believed to have originated from plant and animal substances by a series of complex chemical, physical and geologic processes. The exact nature of the original organic

material is not known yet, and although many valuable data have been assembled on the problem, the complex biological, chemical and geological processes necessary in converting the organic matter of plants and animals into hydrocarbons are not known completely.

It has been reasonably established that petroleum is of organic origin. For example, all petroleum is optically active and according to Walden, writing in 1906, only a petroleum derived from organic matter could have this property. All crude petroleum oils fluoresce or glow in varying degree under ultra-violet (sometimes called black) light. Consequently, the slightest trace of oil will fluoresce under ultra-violet light. One part of crude oil dissolved in 100,000 parts of carbon tetrachloride will fluoresce enough to be observed. The color usually is a greenish yellow to violet glow. A test for fluorescence is used widely in field operations by engineers and geologists to test core samples, cuttings and drilling mud for shows of oil.

The source beds are sedimentary deposits from which petroleum has been or may be generated. Today it is generally believed that petroleum develops from organic substances which are deposited in shallow water marine sediments.

If petroleum is formed from plant and animal organic matter, the reduction of the nitrogen, oxygen, sulphur and phosphorous content of the organic matter is necessary for the formation of petroleum. It is believed that this is accomplished by biochemical changes resulting from the activity of anaerobic bacteria leaving residual compounds consisting principally of carbon and hydrogen.

Geochemical changes are necessary to convert the organic matter of sediments into petroleum and these changes apparently occur after the sediments are buried to considerable depth. Pressure, temperature, radioactivity and catalysis likewise are effective in bringing about the transformation.

C. Migration and Accumulation of Petroleum.

Petroleum is disseminated widely and sparsely in the source beds after its transformation from buried organic matter, although it becomes concentrated in oil fields in large quantity. The movement or migration of petroleum from the source beds into fields containing oil and gas can be divided into two parts:

(1) transverse migration or movement from a source into a carrier bed, and
(2) longitudinal migration or movement through the carrier bed to a suitable trap.

1. Transverse Migration: It is believed that compaction within the source beds is the principal force which causes the movement of oil and gas from common source beds into carrier beds. Compaction squeezes out large quantities of water carrying oil and gas from the clays. The process is aided by capillarity. Bacterial action may play an important role in the migration of petroleum in releasing oil from sedimentary material, probably by the dissolution of limestone, dolomite and other calcareous rocks by the carbonic and organic acids produced by the bacteria.

2. Longitudinal Migration and Accumulation: The term "carrier beds" is employed for any porous stratum through which petroleum may have moved. The fluids, oil, gas and water, undergo gravitational segregation in moving through the carrier beds with the gravitational arrangement which is always found in oil fields resulting. Hydraulic pressure likewise is an effective agency in migration. Many investigators attribute great importance to the differential pressure of gas in the migration of oil and gas and this fact emphasizes the interdependency and common origin of oil and gas. Cementation of the sediments also is of importance in the migration and accumulation of oil and gas.

Regardless of the differences between the several theories, all emphasize the common origin of oil and gas, as constituents of petroleum and the inter-dependence of oil and

gas in migration, accumulation and exploitation of petroleum. Oil and gas being of common origin, no oil field is known which yields oil without accompanying gas. Oil never is produced from a well without some gas. Likewise, natural gas in all probability never exists without some oil in close association. The quantity of oil in a particular reservoir may be too small to allow flow through the reservoir rock into a well-bore of any fluid other than gas. The mere fact that a well produces only gas is no proof that no oil or salt water exist in the same reservoir from which the gas comes. This is no more mysterious than the production of pipe line oil from the reservoirs containing considerable amounts of connate water. In substantiation of these statements careful examination with the microscope and also with ultra-violet light of core samples from the gas-cap in the D-3 zone of the Leduc and Redwater Fields reveals oil in this portion of the reservoir which is capable of producing gas only. Likewise examination of core samples from the Viking zone in both the Leduc and Redwater fields reveals the presence of oil in small amounts despite the fact that no oil has been produced from these zones in these fields. Analyses of natural gas including so-called dry gas from various fields of Alberta always demonstrates the presence of the higher hydrocarbons in addition to methane and ethane. The laws of chemical equilibrium would demand that the corresponding liquid phase should be of the nature of an oil and in all probability this oil phase always is present in any reservoir producing only gas. The classification of natural gas as dry or wet is entirely arbitrary, and depends upon an agreement which must be drawn between the parties concerned. In general, the deeper the accumulation of petroleum the lighter the oil and the greater the proportion of gas associated with the oil although exceptions to this rule may be found.

I have referred in the immediately foregoing to the presence of higher hydrocarbons in the natural gas produced in Alberta and to the fact that all crude oils produced in Alberta are accompanied by gas to some extent. In verification of these statements, I have tabulated

from data available and literature available to me the composition of some petroleum gases of Alberta.

MR. HELMAN: I will tender that as an exhibit, my lord.

THE COURT: Any objections?

MR. RILEY: No, my lord.

THE COURT: Exhibit 126.

LIST OF COMPOSITION OF SOME PETROLEUM GASES OF ALBERTA SUBMITTED BY DR. FANCHER PUT IN AND MARKED EXHIBIT No. 126.

Q MR. HELMAN: And you have another document? A. And the second tabulation I have here shows the physical properties of some crude oils of Alberta.

MR. HELMAN: I would like to have that marked as an exhibit, my lord.

THE COURT: Exhibit 127.

LIST OF PHYSICAL PROPERTIES OF SOME CRUDE OILS OF ALBERTA SUBMITTED BY DR. FANCHER PUT IN AND MARKED EXHIBIT No. 127.

Q MR. HELMAN: You had reached the bottom of page 14, Dr. Fancher.

A 4. Summary of Theory of Organic Origin of Petroleum.

In brief summary of the theory of the origin of petroleum:

(1) The oil and gas fields of the world are in sedimentary basins and the oil and gas productive strata are intercalated nearly everywhere with other sedimentary strata, including deposits regarded as source rocks of oil.

(2) The deposits are capable of treatment to yield distillate close in character to natural petroleum. These deposits are in close stratigraphic relationship to oil and gas zones.

(3) The matter debris of oil, like other organic

sedimentary deposits, is subject to slow metamorphism during which the volatile matter, that which yields petroleum is gradually eliminated, the final residue being graphitic.

(4) Oil (petroleum liquid) never is produced without accompanying natural gas (petroleum gas).

(5) Natural gas is produced without accompanying oil but probably never exists in appreciable amount in reservoirs containing no oil or petroleum liquid.

(6) Oil can be and is produced without accompanying water despite the well-established fact that (connate) water is generally saline, always occurs in appreciable amount in the very strata from which the oil is produced.

5. General Principles of the Production of Oil.

A. Physical Condition of the Petroleum Reservoir.

A petroleum reservoir is made up of porous and permeable rock, the pores of which contain oil and gas under pressure. The oil, under reservoir pressure, contains gas in solution and any gas present in excess of that which can be dissolved in the oil under the prevailing pressure and temperature will be found occupying the higher portions of the reservoir in the form of a gas-cap. Salt water usually is present also, underlying the oil, and occupying the pores of the reservoir rock away from the oil-bearing zone. The original static relationship of the reservoir fluids thus is one of free gas, if present, occupying the crest of the structural feature, oil underlying the gas, and water below the oil. The zonal arrangement of the fluids results from gravitation segregation over geologic time, water being heavier than oil and oil being heavier than gas.

In addition to the underlying water, the oil and gas zone normally contain some water which is called connate water, distributed throughout the pores of the rock and held in place by capillarity. Connate water therefore reduces

the possible amount of oil and gas held by a rock of definite dimension and porosity. The amount of oil that can be produced from the reservoir and put in the stock-tank is still further reduced by the fact that all of it cannot be produced from the rock, and that which can be produced shrinks in volume owing to the escape of the gas dissolved in the oil within the reservoir rock upon reduction of pressure from that of the reservoir to that of the stock-tank. The gas dissolved in the oil in the reservoirs has important beneficial effects on the physical properties of the oil, the most important being the reduction in viscosity which it brings about. Gas in solution increases the mobility and ease of movement of the oil compared with the same oil after release of the gas from solution by decline in pressure. Likewise gas in solution minimized capillary phenomena which decrease ultimate recovery of oil.

B. Mechanism of Fluid Displacement in the Reservoir.

The only practical method of producing oil and gas presently known is to take advantage of the fact that oil and gas are fluids and hence flow in response to a difference in pressure. The art of producing oil and gas, therefore, involves the establishment and control of the flow of oil and gas and water through the reservoir rock. Two requirements are fundamental in order to establish flow, namely:

(1) A positive difference in pressure must be established between the more remote portions of the petroleum reservoir and the well bore.

(2) Some fluid must replace the oil and gas removed from the pores of the productive rock.

The job of the oil and gas producer is to establish flow and fluid displacement and so control the process that maximum efficiency of extraction is achieved. Furthermore, the production of oil and gas requires work and work requires the expenditure of energy. The energy required may be supplied by Nature or by men or by both. The ability of the fluid to flow through a rock depends upon its per-

meability. A rock is permeable if a fluid can permeate it, i.e., flow through it. Furthermore, the ability of a particular fluid to flow through a rock depends also on the amount of that particular fluid present in the pores. The amount present can be too small for a particular fluid to flow through the rock. Furthermore, a particular fluid flows through a rock with the greatest ease when no other fluid is present. Obviously, when oil is unable to flow through a rock, production ceases. Consequently, no oil can be produced from a particular portion of a reservoir rock when the amount of oil present therein is too small to permit flow in response to a difference in pressure. The practical meaning of the concept of permeability and the dependence of the fluid mobility upon the amount of the several fluids present is that the nature of the product produced by a well is not an indication of the absence of fluids in the reservoir which are not produced. Consequently, a well producing only pipe line oil may be producing from a rock containing salt water. Likewise, a well producing only gas may be producing from a zone containing water and oil.

Three basic mechanisms by which oil can be recovered are recognized by scientists. These are:

(1) Simple expansion of the gas released from solution in the oil within each pore of the rock, the expansion of the gas displacing oil toward zones of lower pressure.

(2) Displacement of oil from the pores of a rock by the downward expansion of a free-gas-cap, a process which assists and accelerates the gravity drainage of oil. (note well, the gravitational segregation of the several fluids is maintained in this process); and

(3) Upward displacement of the oil by influx of water from below the oil sand. (note well, the gravitational segregation of the several fluids is maintained in this process.)

These processes have been named by common consent Gas from Solution Drive, Gas-Cap Drive and Water

Drive. The displacing mechanisms differ in efficiency in displacing oil. Seldom in any oil and gas field is any one of these agents the sole agency in oil recovery. Consequently, the degree to which each agent is utilized in production of oil determines the ultimate yield of oil and the behaviour of the field observed. Furthermore, the degree to which gravitational segregation of the various fluids is retained or favored in production determines the practical effectiveness of these mechanisms in stripping the rock of oil.

1. Gas-From-Solution-Drive.

This mechanism of displacing oil from the pores of a rock inherently is lowest in efficiency because it depends on the relatively small amount of gas dissolved in the oil for expulsion of oil from the pores of the rock. Both rate of oil production at any time and ultimate yield are dependent upon the degree of exhaustion of the gas. Production of oil by this mechanism can be prevented or minimized by prevention of wastage of gas from a free-gas-cap and by control of production rate of wells.

2. Gas-Gap-Drive

The gas-displacement mechanism called gas-cap drive is capable of yielding substantially higher ultimate recovery of oil than the gas-from-solution drive. In this mechanism, the displacing action of a downwardly expanding gas-cap maintains pressure on the oil zone and thereby prevents or retards the escape of the gas dissolved in the oil.

The degree to which maximum recovery of oil is achieved by gas-cap drive is dependent largely on the degree to which gravitational segregation of oil and free gas can be maintained during production. Under favorable conditions and proper control yields materially greater than the maximum obtained by gas-from-solution drive and approaching the maximum obtained in any event by a flowing process be obtained. Practical requirements for effective gravitational segregation of oil and

free gas include rocks of high permeability, conservation of gas and pronounced structural relief. Obviously if advantage is not taken of gas-cap drive in the production of oil in a given field, ultimate recovery is reduced and waste results. If the gas-cap is allowed to shrink, oil encroaches up to the oil barren gas cap and a considerable portion of the oil coming into the gas-cap zone can never be obtained. An original gas-cap can be maintained and enlarged by the injection of gas into it rather than by removal of gas. Such an operation is known as pressure maintenance and this operation then becomes a most efficient form of gas-cap drive.

Net withdrawal of free-gas from the cap must be minimized for realization of the full benefits obtainable in gas-cap drive, net withdrawal being the difference between gas produced and gas returned to the reservoir. Careful selection of those wells which are allowed to produce and control of rates of production to avoid channeling or by-passing of free-gas and to favor accumulation and retention of gas in the cap is necessary to achieve maximum ultimate recovery and prevention of waste.

3. Water Drive.

This mechamism for producing oil and gas depends upon the upward encroachment of water into the oil-bearing rock as oil and gas are produced. The displacing action of the encroaching water serves to maintain reservoir pressure by offsetting the effect of removal of oil and gas and by flushing of the oil from the pores of the rock to the maximum extent possible. The water-drive is believed to be the most efficient natural recovery mechanism because the majority of oil reservoir rocks usually prefer to be wet with water, or in other words, hydrophillic. Consequently, the flushing action of water can be very great and the yield of oil a maximum.

The rate at which water encroachment into any reservoir depends upon several factors, the net effect usually being such as to require a rather great restriction in the rate of

production of oil if the natural influx of water is relied upon for maintenance of reservoir pressure.

The physical requirements for an effective natural water drive include a large continuous and permeable water-bearing zone called an aquifer, either extending regionally as a blanket rock or out-cropping nearby. Obviously, water may be injected in the resvoir to augment a natural water-drive to maintain reservoir pressure and increase flushing action.

Because any rock contains pores of a wide range in size the rate of upward encroachment of water must be controlled and kept sufficiently low to enable water to penetrate the pores and flush a maximum amount of oil from them if by-passing and physical waste are to be prevented.

Q Dr. Fancher, I think you want, at this point, to introduce some authorities that you have, to show that this matter had been dealt with at some particular time? A. Yes, sir. Now, it is possible to develop ideas in this form because there is a great deal of recent work that has been done, and I won't refer to recent literature, but I would like to call attention to the fact that the basic ideas here stated have been long known in the industry. In particular, I would like to refer to a reprint here of several pages from "The Geology of the Oil Regions" by John F. Carll. This was published in 1880 and is a part of the second geological survey of Pennsylvania. I also have the book from which these excerpts were photostated here.

Now, from this article by John F. Carll, published in 1880, I would like to read into the record a few excerpts. I will start first beginning with paragraph 460 on page 257.

" It is a fact well established by experience, that the pioneer wells of any district, if drilled within the possible limits of a productive pool, are more certain to prove remunerative than those put down at a later date after the field has been fairly developed, although the latter may be sunken through a

"sandstone of better quality than the former; and the reason of this is obvious if our theory of the physical structure of the oil sand be correct.

Suppose a lenticular deposit of pebble rock stored with oil, to lie embedded in fine argillaceous and almost impervious sandstone which completely isolates it from other deposits of similar character lying perhaps but a short distance from it. In this shape it is practically an hermetically sealed oil tank full of oil and gas, under a tension not susceptible of precise calculation, but which, judging from the effects observed when the pool is tapped, may be 300 pounds or more to the square inch. The first well piercing this deposit, although it may only touch the extreme thin edge of it, will have a large reservoir to draw from, and a tremendous pressure of gas to assist and augment its delivery; whereas one put down after the bulk of the oil has been extracted and the pressure reduced to two or three atmospheres, receives but sluggish streams of oil and feeble gas aid even if it passes through a much greater thickness of oil-bearing rock, and cannot therefore yield so largely."

Q Is that the whole passage? A. No, sir. I want to read at considerable length from this.

Q Yes? A. On page 260 in the same article, and I might say here that the preceding portion has dealt with particular samples, and need not be repeated here. And I continue with the article:

" Facts like these,(and many more might be given in detail were it necessary), point strongly to the correctness of the inference that the oil producing pebble sands lie in pockets or patches so completely surrounded by an almost impervious rock, that practically they may be considered as independent masses and treated accordingly."

That is, in these particular examples.

" In conformity then with this view of the subject let us trace the history of one of

"one of these oil pools from its first tapping by the drill to its final abandonment on account of becoming flooded with water."

And then paragraph 472 follows immediately, and I shall read several paragraphs.

" With the present method of drilling through casing and thus preventing the surface water from following down to the lower rocks, the effect upon tapping the oil sand is quite different from what it was under the old process when the drill hole was full of water. In the latter case the column of water in a deep well held the gas and oil in check and but slight indications of oil would be seen until the well was tubed and a portion at least of the water pumped out. But now the hole having only a few feet of fluid in it when the sand rock is pierced, the effect is similar to the sudden liberation of the safety valve to a steam boiler under a full pressure of steam. The tremendously compressed gas and oil rush at once into the opening - the drill hole is soon filled - and when the depth of well is not too great in proportion to the force of gas, the boiling, foaming mass is driven upwards against the forces of gravity, against the resistance of the atmosphere, and vents at the well mouth or shoots high above the top of the derrick.

The date of the first flow from one of these pools marks the commencement of a new era in its history. For ages the oil has been locked up in the pores of the rock, and there can be little doubt but that an equitable pressure has been established throughout every freely communicating portion of it. The equilibrium is now suddenly destroyed in the immediate vicinity of the well by the liberation of compressed gas and oil seeking a rapid exit through the drill hole, because the pressure in the rock is greater than the forces to be overcome by the oil in its ascent. The result is the rarefication of the elastic and expansile materials filling the pores of the sand rock immediately surrounding the

"perforation made by the drill. Suppose the pressure in a radius of ten feet to be thus quickly reduced from 300 pounds to the square inch to 150 pounds, this allows the next concentric area proportionately to expand and reduce in like manner, and that the next and so on, the movement gradually widening, the pressure gradually reducing until all the freely communicating portions of the rock are relieved, when the oil for lack of propelling force ceases to flow. An equilibrium has been restored. The rock is still full of oil and gas under pressure, but it is counterbalanced by the weight of the column of fluid in the hole and the atmosphere above it."

And that is essentially the theory under which we measure bottom hole pressures and take bottom hole samples today.

The author goes on:

" The pump is now introduced, and lifting the fluid from the level of the sand rock relieves it of a pressure equivalent to the weight of the oil in the hole and leaves the gas free to again go through with the expanding and rarefying processes as before, it having now to overcome only the weight of its own column of gas ascending between the tubing and well walls against atmospheric pressure."

The author then goes on with a descriptions of pumping, which I won't read, but follows with this:

"Still, after all this is done and the well chamber is so thoroughly exhausted by the gas pump that a vacuum gauge may show a downward pressure of 13 pounds to the square inch, the rock contains oil, as is proven by the manner in which it is further acted upon by the introduction of water into it.

Oil and gas in their normal conditions appear to lie in the sandrock not as distinct bodies occupying separate portions of the rock, but as one substance, the gas being as thoroughly incorporated with the oil, as gas is with water in a bottle of soda water.

"Drawing oil from the rock may be compared to drawing beer from the barrel. The barrel is placed in the cellar and a bar pump inserted - at first the liquor flows freely through the tube without using the pump, but presently the gas weakens and the pump is called into requisition; and finally the gas pressure in the barrel becomes so weak that a vent hole must be made to admit atmospheric pressure before the barrel can be completely emptied even by the pump.

The flooding of an oil district is generally viewed as a great calamity, yet it may be questioned whether a larger amount of oil can not be drawn from the rocks in that way than by any other, for it is certain that all the oil can not be drawn from the reservoir without the admission of something to take its place.

If one company owned all the wells drawing upon a pool, and had accurate records of the depths and characteristics of the oil producing stratum in each well, it is quite possible that some system might be devised by which water could be let down through certain shafts, and the oil forced toward certain other shafts where the pumps were kept in motion, and thus the rocks be completely voided of oil and left full of water. As it is, however, no systematized plan of action can be adopted. The careless handling of one well, by which water is let down to the oil rock, may spoil several others belonging to different parties. A clashing of interests at once arises and is likely to result in disaster to the whole district."

I believe those are the portions of major interest, although throughout this article there is a remarkable display of understanding of the behaviour of fluids in reservoir sands, and this was published in 1880.

MR. HELMAN: I will tender that as an exhibit, my lord.

MR. RILEY: I take it the word "petroleum"

was never mentioned by that author?
A He uses "oil and gas".
Q As two substances?
MR. HELMAN: You are not cross-examining the witness yet.
MR. RILEY: I am just wondering.
A I believe, sir, didn't I read that the oil and gas are so intimately associated?
MR. RILEY: The trouble is that we have not got a copy here to follow you. That is one of the difficulties.
THE COURT: Exhibit 128.

PHOTOSTATIC EXCERPTS FROM "THE GEOLOGY OF THE OIL REGIONS" PUT IN AND MARKED EXHIBIT No. 128.

Q MR. HELMAN: Have you exhausted the material which you wished to refer to at this stage?
A Shall I go on?
Q You have no other authority to offer at this time?
A I would like also to offer photostatic copy of portions of the United States Bureau of Mines publication, Technical Paper 51, entitled "Possible Causes of the Decline of Oil Wells" by L.G. Huntley. This was published in 1913, and I shall not read any of this, but simply state that in a portion included here there are several references to this earlier work of Carll and the exposition and the application of these principles in the recovery of oil.
THE COURT: Mr. Helman, do you wish to put it in?
MR. HELMAN: Yes, my lord.
THE COURT: Exhibit 129.

PHOTOSTATIC EXCERPTS FROM TECHNICAL PAPER No. 51, UNITED STATES BUREAU OF MINES, MARKED EXHIBIT 129.

Q MR. HELMAN: You had stopped at the end of the first paragraph of page 22.
THE COURT: That is paragraph 4 entitled "Mechanism of Recovery to Ultimate Recovery and Physical Waste".
A Yes.

THE COURT: I think we will adjourn now until 9:00 o'clock tomorrow morning. We have had a good long day today, or shall we commence at 9:00 o'clock tomorrow morning?
MR. STEER: I would like very much personally to do so, my lord, if there is any chance of finishing tomorrow.
THE COURT: We are going to finish tomorrow or Saturday.
MR. STEER: Yes, my lord.
MR. NOLAN: I am so accustomed now to getting up early in the morning that I have no objection to starting at 9:00 in the morning.
THE COURT: All right. We will resume at exactly 9:00 o'clock tomorrow morning.

: : : : : : : :

MORNING SESSION,
November 24th, 1950.

THE COURT: All right, Mr. Helman.
MR. HELMAN: My lord, before I proceed further with Dr. Fancher, I would like to put in a document, and I think this is perhaps a convenient place to do it. Your lordship will remember when I was cross-examining Dr. Fancher there was some reference to an article on petroleum in Collier's Encyclopedia, and I forget whether it was number 50 or 51 that was left as a place for this exhibit when we got a photostatic copy of it.
THE COURT: Exhibit 50.
MR. HELMAN: I would like now to put in a photostatic copy of it and have it marked as the exhibit which it should be marked.
THE COURT: Well, what I have here as Exhibit 50 refers to sheet 616, with reference to crude oil and natural gas, and a photostatic copy to be presented to the court.
MR. HELMAN: It was a part of the article, my lord, and my understanding was that the whole article was going in which contains that table at page 616, my lord.
THE COURT: All right, mark it Exhibit 50.

PHOTOSTATS OF PAGES 606-631 COLLIER'S ENCYCLOPEDIA MARKED EXHIBIT No. 50.

GEORGE HOMER FANCHER, recalled, already sworn, examined by Mr. Helman, testified as follows:

Q Dr. Fancher, yesterday when we adjourned, you had read some excerpts from Carll & Huntley. Have you finished what you wished to present at that point?
A Yes, sir. I was asked to prepare an extract from that bibliography of the titles which I was endeavouring to read, and I have done that, and present them in the form of two tables. The first table includes those titles in the bibliography referring to gas, and the second refers to those titles from the bibliography referring to the Canadian petroleum industry.
Q Now, let us just check that for a moment, Dr. Fancher. This bibliography was made Exhibit 123, and what you

are now putting in are the titles from Exhibit 123 that you desire to have specially brought to the attention of the court, the first one being those titles in the bibliography, which was dated in 1886, which referred to gas, and I present that as an exhibit, my lord.

THE COURT: I do not know what they are. I know this, that I have got Exhibit 121, a list of articles written by Dr. Fancher.

MR. HELMAN: That is the list of articles that Dr. Fancher himself had written, my lord, and then Exhibit 122 is the Report of Dr. Fancher.

THE COURT: Yes. And 123 is the list of books to which he has or was referring, and 124 is blank.

MR. HELMAN: Mr. Nolan points out to me that you reserved Exhibit 124, my lord, for, I think, both of these lists. They can go in as "A" and "B". You see, my lord, the import of it is that Exhibit 123 is a bibliography of publications relating to petroleum

THE COURT: Yes?

MR. HELMAN: And I will present as Exhibit 124-A the list of titles in that bibliography that relate to gas that have been picked out of it by Dr. Fancher.

THE COURT: Exhibit 124, is it?

MR. HELMAN: I was going to suggest that your lordship make it Exhibit 124-A, because there is another part to it.

THE COURT: Yes. Exhibit 124-A.

DOCUMENT PREPARED BY DR. FANCHER SHOWING LIST OF TITLES REFERRING TO GAS FROM BIBLIOGRAPHY EXHIBIT No. 123 PUT IN AND MARKED EXHIBIT 124-A.

Q MR. HELMAN: And Exhibit 124-B is a list of titles in the bibliography which refer to articles about Canada.

THE COURT: Yes.

DOCUMENT SHOWING TITLES REFERRING TO CANADIAN PETROLEUM INDUSTRY PREPARED BY DR. FANCHER PUT IN AND MARKED EXHIBIT 124-B.

Q MR. HELMAN: Now, I think, Dr. Fancher, that you were reading your report at page 22, and had reached the item headed "4" in the fifth line?

A Yes, sir.

Q So that I think you may proceed from there and continue unless there is some other thing you want to refer to at this stage? A. No, sir.

Q I see. All right, Dr. Fancher.

A 4. Relation of Mechanism of Recovery to Ultimate Recovery and Physical Waste.

The degree to which these basic mechanisms of oil recovery operate in practice in any oil field determines the ultimate recovery and hence the physical waste resulting, the latter being simply the difference between the maximum recovery possible and that actually obtained. Maximun ultimate recovery is obtainable by producing oil by the medium of gas-cap drive and water-drive and the prevention of production by gas-from-solution drive as far as possible.

Other things being equal, the most important physical factors governing oil recovery in practice are the permeability of the rock and the viscosity of the oil under reservoir conditions, because these factors determine the mobility of the oil. High permeability and low viscosity always are conducive to high yield within the limits of the particular mechanism of recovery by means of which the oil is produced. Furthermore, if permeability is good and viscosity of the oil is low, the entire process of recovery is accelerated, gravitational segregation of fluids is fostered and effective utilization of water-drive is more feasible economically. The permeability of the reservoir rock is determined by nature and cannot be altered to a significant degree by man. The viscosity of the oil under reservoir condition depends upon the amount of gas in solution, and the amount of gas in solution depends upon the reservoir pressure which is con-

tollable and consequently the viscosity of the oil is controllable by man within limits.

Ultimately, the recovery of oil from any field is further determined in addition to the factors enumerated by economics. Production must cease when the cost becomes too great to enable a reasonable profit to be made. The point in the depletion cycle at which economics limits ultimate recovery of oil differs widely in oil fields, but in a broad sense may be appreciated by considering the effect of such factors as excessive water production, excessive gas re-cycling and the like upon cost of production, and the economic limit of stripper production.

The gas in a petroleum reservoir is a mixture of hydrocarbons, some of which are more valuable than others, although usually less valuable than oil. The more valuable constituents are those constituents of natural petroleum gas that are easily liquefied such as propane, butane, pentane, and the like. Inasmuch as these more valuable constituents usually are present only in small amounts in the gas, they can only be recovered if they are produced by flowing through the reservoir rock in the gas phase before allowing them to condense either in the flow-string of the well or the oil-gas separator of the recovery plant.

If these hydrocarbons condense in the reservoir the amount of liquid so produced is too small to enable flow to well-bores in response to a difference in pressure. Consequently, for maximum recovery of valuable but easily condensible hudrocarbons from the gas in a reservoir, the reservoir pressure must be maintained at the point of minimum condensation.

Consideration of all these facts leads to the conclusion that the maximum recovery of oil depends upon control of the reservoir as a whole. The reservoir point of view must be maintained in operation of an oil well to achieve maximum recovery of oil. What is best for the reservoir is best for ultimate recovery of oil. The reservoir point of view may mean the injection

of fluids, restriction of rates of production, the maintenance of pressure, maintenance of gas-cap, the closing-in of some wells and the opening of other wells from time to time. In brief, a maximum of flexibility in operation of an oil field is essential to maximum recovery of oil and prevention of waste. Furthermore, our knowledge of reservoir behavior has advanced to the point that the petroleum engineer and geologist, after reasonable development in a new oil field, can diagnose the situation like a physician does from observation of symptoms and prescribe the remedy. Sometimes the remedy may be unpalatable to the patient, but, nevertheless, is essential to efficient recovery of health by the patient and to efficient recovery of oil from an oil field.

6. The Leduc Field

The chief structural feature of the Leduc field is a local high within a complex reef of carbonate rocks (dolomite and limestone). Three porous and permeable zones within the Devonian rocks are encountered by wells drilled in the field which are known respectively as D-1, D-2 and D-3.

The D-1 Zone (4900-5000 feet) - those are approximate figures, of course, in talking about the reservoir as a whole - contains petroleum in the form of considerable natural gas and some oil. The rocks of the D-2 zone are a cream to light brown dolomite, silty in the upper part and more and more argillaceous toward the bottom, the total thickness being about 150 feet. The oil in the pores appears to be trapped by barriers formed by secondary deposition of anhydrite within the pores. The porosity is both inter-granular and vugular, about 60 per cent of the former and 40 per cent the latter. Furthermore, the vugs usually are filled with secondary anhydrite. The porous zones are thin sheets separated and isolated by dense, non-porous dolomite. The average porosity probably is about 10 per cent. The permeability likewise is low, probably about 25 millidarcys on the average.

Q Might I interrupt you, Dr. Fancher. What is a vug? It is not a word with which we would be probably familiar? A. It is a relatively large hole or pore in the rock.

Q And what are millidarcys? A. A millidarcy is the unit of permeability.

Q Can you explain it any further? How it is arrived at, the measurement of it? A. Yes, sir. Permeability is defined in general terms as a measure of the ability of the rock to transmit fluid. If one translates that definition into the pertinent physical quantities which must be measured one arrives at a definition of a unit. And more specifically, although somewhat generally, permeability is measured in the laboratory by the actual passing of a fluid, usually air, through the rock, and from observation of the pertinent factors the mathematical quantity can be calculated.

Q Thank you. A. The deepest producing zone in the Devonian is the D-3, consisting of a light brown dolomite some 150 feet thick which is found at about 5250 feet. Green shale appears to overlie and cap the D-3 zone. The dolomite is crystalline and is vugular and fractured. Apparently the rock is a limestone reef which has become fractured and dolomatized and which has only a limited east-west extent. Owing to the great proportion of vugs, the average porosity of the D-3 zone is about 13 per cent. The average permeability of samples from wells ranges from 25 to 500 millidarcys.

The oil in the D-2 zone was saturated with gas at the original reservoir of some 1760 psi. Likewise, at discovery, the oil of the D-2 zone was saturated with gas at the original reservoir pressure of nearly 1900 psi. The gravity of oil from either zone is about 38 API.

With these facts in mind, the D-2 zone consists of about 30 feet of saturated oil-bearing rock, underlain by an erratic water table and overlain by a very small gas cap in the southeast. The chief agency for expulsion of oil is solution gas drive, the water not being active. Gas must be conserved and used efficiently to achieve maximum recovery of the oil. Injection of water and gas may be effective locally, but the random distribution of porosity makes this impractical over most of the pool. Maximum recovery of oil from the D-2 zone depends almost solely upon the control and conservation of gas rather than upon secondary recovery or any other production practice now known.

The D-3 zone is much more permeable than the D-2 and contains a gas cap which at discovery was at least 1.5 times the volume of the oil-bearing zone. Although the water in this reservoir is effective, the chief agency of expulsion in practical production will be gas-expansion. Probably injection of water can be employed to advantage in obtaining maximum recovery of oil, but the economics of doing so will require careful study and analysis. Careful control is required to prevent channeling of oil, coning of wells, and maintenance of the flowing life and maximum recovery. Obviously, the gas in the reservoir is a part of the reservoir fluid in so intimate an association that conservation of oil requires conservation of gas, and vice versa. Clearly, separate ownership of oil and gas mitigates against efficient recovery.

7. Impracticability of Separate Ownership of Oil and Gas.

If gas and oil were owned separately in the same field, certainly production of either or both with economy and efficiency without significant loss in ultimate recovery would be not only difficult, but virtually impossible, the interest of the owner of the gas being diametrically opposed to those of the oil producer. The condition reminds us of the classic nursery rhyme:

"Mother, may I go out to swim?"
"Yes, my darling daughter,
Hang your clothes on a hickory limb,
But don't go near the water."

Only in this case, the owner of the gas may say to the oil producer, "Produce your oil without waste, but don't produce my gas."

Oil, for example, can not be produced without producing gas from a field having only oil containing gas in solution and no free-gas-cap, which is, for example, the condition in the D-2 zone in the Leduc Field. Obviously, oil could not be produced from such a field without also producing gas because the gas is dissolved in the oil. Furthermore, whenever gas comes out of solution in the oil

to the extent that the pores throughout the rock contain some 20 per cent of free gas, free gas also flows to the well along with oil, and one fluid can not pass through the sand without the other accompanying it. I would like to say when I use the word "sand" here, I do not imply that these producing zones are sands. I am just using that as a word that we commonly use to indicate the producing zone or the rock, whatever its mineral composition may be.

Q I suppose that is a technical word that is used for that? A. Yes, sir. It is one of our careless expressions, yet used commonly. In other words, in such a petroleum reservoir one with no free gas-cap at discovery, gas can not be prevented from entering the oil well. The only remedy, if oil from a well in such a reservoir is to be produced and marketed would be to produce both fluids, separate the oil from the gas, and return the gas to the reservoir.

If a reservoir containing petroleum had a free-gas-cap at discovery, as, for example, was the case in the D-3 zone of the Leduc field, the same situation discussed in the preceding paragraph would prevail with respect to all oil wells producing only from the oil zone proper below the gas-oil contact. However, gas could be produced without producing oil by those wells completed only in the gas cap, but this could be done only at the expense of rendering a very large proposition of otherwise recoverable oil unrecoverable. In other words, production of gas from the gas cap prior to exploitation of the oil zone would result in substantial and serious permanent physical waste of oil.

Complications in production and continual controversy would arise if the title to both gas and oil were divided. Additional installation in more elaborate surface equipment than is used customarily would be required. For example, more meters, by-passes, traps and separators would be needed because each fluid would have to be accounted for prior to final disposition. The relative amount of oil and gas produced could be varied within wide limits by conditions of separation at the whim of the operator. The question would arise invariably "who owns the well, and who, therefore,

is entitled to control its operation?" Should the well be operated by the owner of the gas, what will become of the oil?

Clearly, a diversity of interests results. If the gas be separately owned, the owner of the oil would be under no obligation to produce gas. Even if a gas cap should exist in a field, as in the D-3 zone in Leduc, much of the gas is in solution and this gas must be produced with the oil except for that coming out of solution which remains in the reservoir as the reservoir pressure decreases. Secondary recovery methods for increasing recovery would be difficult to employ in a field where one individual owned the gas and another the oil. Underground waste would result should the gas from the cap be produced to such an extent that the oil would rise and invade the gas cap, because a large portion of the oil would be irretrievably lost because of the oil needed to wet the pore walls of the rock.

Q Now, Dr. Fancher, before we proceed any further with the reading, you have prepared some diagrams which will illustrate to the court some of the problems that you have been discussing with us, and we have these large diagrams placed on the easel, and here are smaller copies of them for the use of the court. We have already given Mr. Steer a copy. Now, these are arranged in a certain order, and I notice the first one is entitled, "Stages in the Life of an Oil Pool with Inactive Water - Improperly Produced", and that has been given your number of Figure 1. Now, is that a diagram or chart that was prepared under your direction, Dr. Fancher? A. Yes, sir.

MR. HELMAN: I would like to have that marked as an exhibit.

THE COURT: Figure 1 will be Exhibit 130.

FIGURE I PREPARED BY DR. FANCHER MARKED EXHIBIT 130.

Q MR. HELMAN: Now, will you just explain Exhibit 130 to us, your Figure No. 1, Dr. Fancher, and its significance. A. In this chart, three different stages in the life of an oil pool with inactive water are illustrated on the hypothesis that this field would be improperly produced. By

"improperly produced" I mean not in accordance with the principles which I have just discussed. This method of operating an oil pool of this type is one that was common practice in the early days of the industry.

Looking specifically at the three conditions, we have a cross-section of a hypothetical reservoir illustrated in which, according to Sterry Hunt's anticlinal theory, we have an anticline capped by dense impervious cap rock, and in this anticlinal fault or structure we have high pressure free gas in the upper zone, and underlying the gas a zone that contains chiefly oil saturated with gas, and the connate water, of course, That is associated with rocks always in those zones. And underlying the oil saturated with gas zone we have the water zone. And the three colours used here designate the zones, pink for the gas, green for the oil, and the blue for the water. In this initial condition -

Q That is the furthest one to the left, Dr. Fancher? We have three. A. I was still talking about the condition of the reservoir, sir.

Q I see. A. In the initial condition the pressure in this reservoir is sufficiently high to cause oil to flow and the water is inactive, which means that the permeability of the rock is such that the water table can not advance appreciably in an upward direction.

Q Well, what I was getting at, there are three reservoirs illustrated in Exhibit 130? A. Yes, sir.

Q And you are talking right now about the reservoir that is furthest to the left, Dr. Fancher? A. Yes, sir, that is right. This is the initial condition. Now, three possible wells are shown here. Now, the well furthest to the left, when it was drilled in initially in this condition, it would be a flowing gas well, and the gas-oil ratio that we observe for this well when it is new would be low.

Q You said a flowing gas well? A. A flowing oil well, I am sorry.

Q Yes? A. The centre well, the one drilled at the apex of the structure, you will notice it has not completely penetrated the reservoir, but is completed within the gas cap. This is a gas well and gas would be produced by that well initially.

The well to the right was a little further downdip on the structure, nevertheless it was completed within the oil zone, and it was completed in the manner which has been previously described by witnesses here. It has penetrated to the oil productive zone, and this well initially would flow and produce only oil, and it would have a low gas-oil ratio. You see, it would be physically impossible for this well under the initial conditions portrayed here to produce anything but oil or water. The water, however, the production of water was prevented by the fact that the well was stopped within the oil zone.

Now, if you will look to the left again, the flowing oil well, the first well, you will notice that this penetrates the reservoir right at the gas-oil interface. This well would have to be carefully completed. In other words, the liner that Mr. Gustafson was discussing would have to be shot well down within that oil saturated zone in order to produce only oil with a low gas-oil ratio, but, nevertheless, it is physically possible to do that.

Now, if, as in the early days of the industry, there were unrestricted production, and each well was allowed to produce as much as it could, we would arrive at a condition some time in the life of the field that could be illustrated by this second stage, this centre reservoir, on this second sketch of the reservoir. And here we have the wells in the same condition, the same reservoir, but as the result of partial completion in unrestricted production we have a condition within this reservoir that may be portrayed as follows: The oil well furthest to the left is flowing now intermittently. It has a high gas-oil ratio for the reason that gas has come out of solution and now fills the pores of the rock to an extent of 20 per cent or greater and the gas as well as oil flows to that well. Gas has come out of solution throughout the oil zone.

In the centre well, the gas well, it still is producing gas, but owing to the depletion of the gas cap, and the fact that it has been producing at a high rate, as well as the oil wells, we notice that the gas-oil contact has risen upward and is approaching the gas well. On the other

hand, the reservoir pressure is much lower and the ability of this well to produce gas no doubt has decreased. Now, I do not or did not read the legend in detail.

Q I think perhaps you had better do that, Dr. Fancher.

A All right, sir. In this intermediate condition, the production of the gas well in the centre has released pressure to such an extent that wells on the flank could flow intermittently and also to produce an excessive amount of gas. Gas coming out of solution in the oil zone is causing the oil to shrink and to become less mobile. Oil has invaded the gas-cap and much of it is irrecoverable. Water is inactive. Less than 10% of the oil in place has been produced in arriving at this condition despite the large amount of gas produced. Oil has been trapped in the gas cap. That is indicated by the irregular line which is above the section of the original dotted line that indicates the original gas-oil contact.

I might point out that this oil that is trapped and that I said is lost in the gas-cap zone should not be visualized entirely as a coating of oil adsorbed on the surface, but you will recall that I stated just a few minutes ago that if the oil in the pores of the rock is present in a volume sufficient in amount and below a critical amount oil will not flow freely through that, and so we can arrive at that critical saturation situation and lose considerable oil.

Now, the final condition -

Q We are now looking at the part of the chart which is the farthest to the right? A. Yes, sir. The final condition is portrayed by this sketch on the right, and by "final condition" I mean to imply when the economic limit has been arrived at in a field with these conditions and produced in this manner. Again, we have the wells in the same position, but you will notice that owing to the depletion of the gas cap, which now contains considerable less gas for two reasons, the total volume is much lower and the pressure is very low, that virtually all of the gas has been produced, leaving dead oil which drains slowly into the wells. The well on the left will have to be deepened and pumped, whereas the well on the right already

requires pumping. That is due to the small thickness of oil productive zone available to the well, and the fact it is so far down-dip. Only wells on the flank can continue to yield oil at slow rates. The oil zone contains a great amount of oil, much of which could have been recovered in the gas had not been wasted. The oil recovery is low, probably being no more than 20 or 25 per cent of that originally in place. The end result is maximum preventable waste and unnecessary high cost of operation.

Q Doctor, you did not mention the centre well in there, as to what has happened to it? A. The pressure in the reservoir is so low that probably this gas well can not produce gas at a commercial rate.

Q. Do you mean it is not producing either gas or oil?

A Yes, as far as gas is concerned.

Q The only reason I asked you that was because the chart seemed to show the top of it going up? A. Yes, sir.

Q And that the oil was connected with the centre one, but it, as I understand your evidence, is not producing oil in commercial quantities? A. Not in the condition shown. You see, the pressure is low in the reservoir. Now, this particular well, of course, could be deepened, obviously, and it could be pumped and it would be a small producer of oil, but not of gas.

Q Well now, let us pass to your Figure No. 2, Doctor.

A Yes.

Q Now, that is a chart that has been prepared under your direction, Dr. Fancher? A. Yes, sir.

MR. HELMAN: I would like to have that marked as an exhibit, my lord.

THE COURT: Exhibit 131, Figure 2.

FIGURE No. 2 PREPARED BY DR. FANCHER PUT IN AND MARKED EXHIBIT 131.

Q MR. HELMAN: Now, that is captioned "Stages in the Life of an Oil Pool with Inactive Water - Properly Produced"? A. Yes.

Q Now, will you just explain that, Doctor, to us, that chart? A. Yes, sir. In this chart three possible stages in the life of a hypothetical reservoir are portrayed. The initial conditions in this reservoir are essentially the same as that in Exhibit 130, but the assumption is made that this

field is operated properly, in the sense that it is operated in accordance with the principles of efficient production to which I have referred in preceding testimony. And here I should point out that the decision to operate a pool in a definite manner should and must be made early in the life of the pool, because you can not go back and repeat.

In this sketch or illustration the initial condition is portrayed by the left hand cross-section and here again we have three wells penetrating a reservoir in which gravitational segregation of the fluids exists.

The well on the left you will notice in drilling penetrated both the high pressure free gas zone and the underlying oil zone which is saturated with gas. If this well were properly completed, in other words, opened to the zone, opened only to the oil zone, this well would produce oil which would flow and which would produce with a low gas-oil ratio because the initial condition in the reservoir is that the pressure in the reservoir is sufficiently high to cause the oil wells to flow. The water is inactive and will not encroach upward as the reservoir is depleted.

The centre well was drilled at the apex of this anticlinal fault. It penetrates only the high pressure free gas zone. This well is capable of producing gas, and it would be termed properly a gas well, but in accordance with the principles laid down that this gas cap should be used to bring about or to accelerate and increase the recovery of oil from the oil zone, because that is the difficult job in production, this well is shut in.

The well on the right you will notice did not penetrate the high pressure gas zone. It did penetrate the oil saturated with gas zone and was stopped short of penetration of the underlying water zone, therefore this well would flow and it would produce with a low gas-oil ratio. It could not help producing in that condition.

Some time intermediate between the opening of this oil pool and its abandon-

ment, a stage could be arrived at in the production cycle that is illustrated by this second cross-section, the centre one. Here we have the well on the left still flowing. It is producing with a higher gas-oil ratio than it did originally and, moreover, the gas-oil ratio of this well has a tendency to increase, the reason being that the gas cap has been allowed to expand, and has expanded downward, and that gas can flow into some of the perforations of this well.

Q Well, that is illustrated, is it, by that dotted line?

A Yes, sir. The position of the original gas-oil contact is carried right across through the three illustrations.

Q So that where we have the extension of the pink below the dotted line, it shows the extension of the gas cap?

A Yes, sir, the expansion of the gas cap, the growth in volume. Now, you will notice that the gas cap is not only larger in volume, but it also is at a lower pressure. The expansion, reading the legend, that is, in this intermediate condition, the expansion of gas in the gas cap results in uniform downward drainage of the oil zone. Also the oil contains gas in solution, thus making the oil more mobile. The process can be accelerated by injection of gas into the cap. That, of course, depends on economics. The gravitational segregation of the three fluids, gas, oil and water, existing at discovery, is maintained during production.

And then the cross-section on the right illustrates the final condition in the life history of this oil pool. Here the well on the left is still capable of producing oil, whether it may require pumping, it will produce with a relatively high gas-oil ratio unless remedial work has been done on this well. And it is possible that the water has risen a bit. The assumption was that it was inactive, but, after all, these are relative terms, and this sketch is used to indicate a condition that frequently arises in that respect.

The centre well is still capable of producing gas. However, it is shut in as it was in the original condition, and in the intermediate condition. However, as soon as the production of gas, I mean, the production of oil is uneconomic or relatively unprofitable in this field, this gas can be produced and marketed.

The well on the right is still capable of producing oil, and, as the water table has risen a little, it would produce water unless remedial work were undertaken. In this final condition, we have obtained a high recovery of oil from the oil zone. Eventually the oil wells will become pumpers, but the installation of pumps has been delayed because the energy from the overlying gas was utilized. Virtually all the gas is still in the reservoir available for use. The condition can be accelerated by injection and re-cycling of gas in the cap.

Q I see. So that the net result of that is that the gas well in the centre should be kept shut in during the whole life of any possible obtainment of oil?

A Yes, sir.

Q From the oil saturated with gas zone? A. Yes, sir.

Q Yes? A. And obviously a pool of this type, operated in this manner, will produce a vastly greater amount of oil.

Q Well now, let us take your next chart, Dr. Fancher, which is your Figure 3? A. Yes, sir.

Q That was prepared under your direction? A. Yes, sir.

MR. HELMAN: I would ask that be marked as an exhibit.

THE COURT: Exhibit No. 132.

FIGURE No. 3 PREPARED BY DR. FANCHER PUT IN AND MARKED EXHIBIT 132.

Q And it is captioned "Stages in the Life of an Oil Pool with Active Water - Improperly Produced". Will you just explain that to us? A. Yes, sir. On this sketch I have illustrated three stages in the life of an oil pool with active water drive based upon an assumption that this pool is improperly produced. In other words, by "improper", I mean produced in the manner of the older method of unrestricted production and failure to consider reservoir conditions. The cross-section at the left shows the initial condition. Reading the legend, the pressure in the reservoir is sufficiently high to cause oil wells to flow. Water is active, and rises into the oil zone when the reservoir pressure is lowered, and the reservoir pressure would be lowered if fluid contents are removed.

Now, looking at the cross-section we have on the left, a well which penetrated both the high pressure free gas zone and the oil zone which contains oil saturated with gas, it was stopped short of penetration of the water zone. This well would be completed with perforations only in the oil zone and it would flow and it would produce with a relatively low gas-oil ratio, very low.

The second well was located on the apex of the anticlinal fold. It was stopped then within this high pressure gas zone, within the gas cap, and you will notice that even if it were deepened in this case it could be nothing but a gas well.

The well on the right could not penetrate the gas cap and, consequently, it is in the oil zone saturated with gas and it flows and produces with a low gas-oil ratio.

The centre cross-section portrays an intermediate stage in the life history of this reservoir. Reading the legend in this intermediate condition, production of gas well, of the gas well in the centre, has released pressure in gas cap, causing erratic displacement of the oil by the water. The rapid advance of the water flushes only the more permeable portions of the oil zone, whereas oil in the "tighter" portions is trapped. The wells on the flanks eventually will produce water in ever-increasing proportion to the oil. In other words, these wells are allowed to produce at an unrestricted rate. You will notice that the oil well on the left as a result of its particular location on the anticlinal fold produces both oil and water. It produces water because the water had encroached up, not only had encroached upward in the oil-bearing zone, but it perhaps has coned into that well to some extent. It is difficult to say that on this sketch.

The gas well in the centre, which originally was capable of only producing gas, now is producing gas in lesser volume because it is producing from a gas zone which now is at medium pressure, a lower pressure. It, however, also is beginning to produce oil because the oil zone has

coned upward to this gas well and an attempt has been made to illustrate the bypassing of oil by those green dots there. It is not indicative of the location, nor of the amount.

The well on the right in this intermediate condition, which originally was capable of producing oil, now is producing some oil and a considerable amount of water.

And then the final condition that would occur if each of these wells were allowed to produce without restriction is portrayed by the sketch on the right. In this cross-section, the final condition, reading the legend, is that further drainage of the gas cap continues to allow the oil zone to move upward, leaving much oil trapped behind. The wells on the flanks produce water in ever-increasing amounts, whereas the centre well, originally productive solely of gas, now yields little gas, little oil, and much water. Gas is now gone, the oil zone is drowned with water, the average recovery of the oil has been low, and the lifting cost has been high. Although much oil remains in the reservoir, it is lost forever. And when I say "low", it is possible that this recovery compared with the recovery from the pool producing under different conditions, and with inactive water drive, namely, Exhibit 130, it is possible that this recovery has been higher, of course, than that, because the water is a more efficient displacing medium.

Now, looking at the cross-section, we see that the well on the left, which originally was a good oil well, now is capable of producing only water. The well on the right is a good water well, and only the well in the centre is capable of producing commercial fluids from this reservoir.

Q Now, we will go to your next chart, your Figure No.4, and will you tell us whether or not that is a chart which was prepared under your direction? A. Yes, sir, it was, or it is.

THE COURT: Exhibit 133.

FIGURE No. 4 PREPARED BY DR. FANCHER PUT IN AND MARKED EXHIBIT 133.

Q MR. HELMAN: And this is captioned "Stages in the Life of an Oil Pool with Active Water - Properly Produced". By the way, Doctor, the Leduc field has got active or inactive water? A. The D-3 zone has an active water drive.

Q I see. Now, will you just explain to us your chart, Figure 4, Exhibit 133? A. Yes, sir. In contrast to Exhibit 132, we have here three possible stages in the life of the same pool if the decision has been made early in the life of the pool to produce it properly in accordance with the principles of efficient production practice, which I have discussed previously.

The initial condition in this reservoir is portrayed by the sketch on the left, and it is identical with that portrayed on Exhibit 132. In this initial condition the pressure is sufficiently high to cause the oil wells to flow. I notice an error in this legend. It says that the water is inactive.

Q That should be "water is active"? A. The water is active.

Q So that we should strike out the word "in", being part of the word "inactive", in Exhibit 133 in the legend furthest to the left, underneath the caption "Initial Condition"? A. Yes, sir. The reservoir contains a gas cap, the upper zone, of high pressure free gas and underlying it an oil zone containing oil with gas in solution, and underlying the oil zone a water zone.

The well on the left you will see was drilled in such a location on this anticlinal fold that it penetrated above the high pressure free gas zone, it penetrated both the high pressure free gas zone and the oil bearing zone. However, this well was opened to the producing zones or opened to the reservoir only within the oil bearing zone and, consequently, it is a flowing oil well and produces oil with a low gas-oil ratio.

The well in the centre was drilled at the apex of the anticlinal fold and, obviously, with this location could only produce gas, therefore this well is shut in despite the fact that it is capable of producing gas.

The well on the right, as a result of its location, which was down on the flank of the fold, penetrates only the oil-bearing zone containing oil with gas in solution. It was stopped short of the water zone. It produces oil with a low gas-oil ratio and because of the high pressure this oil can be produced by flowing.

The centre cross-section shows the intermediate condition, and reading the legend, by properly controlling the rate of production, i.e., by producing oil wells slowly enough so that encroaching water will displace the oil produced, the reservoir pressure will remain high and the wells will continue to flow. By keeping the gas in the gas cap, erratic movement of the encroaching water is prevented, and trapping of oil is minimized. The process may be accelerated by injection of water down dip. In other words, if you want to remove oil from the reservoir as a whole at a greater rate than the particular activity of this water, this active water will permit, nature can be assisted by injecting water down dip.

In this cross-section you see that the gas well is still shut in, that the original water-oil contact, which is illustrated by the dotted line, has now risen and occupies a position indicated by the solid black line, the lower solid black line, bounding the green colour, and the well on the left still flows and still produces oil with a low gas-oil ratio. The well on the right likewise still flows and produces oil with a low gas-oil ratio.

The cross-section on the right portrays the final condition in this reservoir. Reading the legend, a large amount of oil, about 75%, in the oil zone has been produced, because the water encroachment has been controlled by keepint the gas in the gas cap. The wells on the flanks will eventually produce water. All the free gas originally present is in the reservoir available for later use. Lifting cost is at a minimum because oil has been produced by flowing. The process may be accelerated by injection of water.

Looking at the sketch, we see that the well on the left still produces oil by flowing. It is producing water or will be unless remedial work has been undertaken to block off that portion of the bore hole which now is penetrating the water zone.

The gas well is still shut in. And the well on the right is still producing oil by flowing. It is producing water unless, again, remedial work has been undertaken, although you can see that owing to the position of this well so far downdip on the anticlinal fold there is not very much possibility of doing much remedial work without isolating the well completely from the reservoir.

Q Now, I notice that in the last legend that you read, Dr. Fancher, you said "a large amount of oil, about 75%, in the oil zone has been produced." Now, would you care to give us an estimate, and I know it can only be a very general estimate, about the difference in the amount of oil produced when the oil pool has been produced with active water in it and what would be produced under the last chart, your Figure 3, Exhibit 132, where it has been improperly produced?

A I think the only statement I could make is that a substantially greater amount has been produced. It might be as much as twice; it might be a little less than that; it might not even be as much, or it might be even more. It depends so much upon obtailed conditions, which you can not illustrate here, such as the uniformity of the rock itself with respect to permeability and the porosity, and all those numerous things which actually must be taken into consideration. Does that answer the question?

Q Well, I think it answers it because in your opinion there could be a very substantial loss of oil?

A Yes, sir.

Q Between where it is properly and improperly produced?

A Yes, sir.

Q I notice in these charts the parts that you have marked in green you have called it "oil with gas in solution"? A. Yes, sir.

Q Now, just confining your answer to that particular substance in the reservoir, the oil with gas in solution, will you tell us whether or not it is a liquid? A. Yes, sir, it is.

Q Now, you were reading at page 29, I think you had

come to heading 8. A. Physical Waste of Petroleum. In order to understand "physical waste" in petroleum reservoirs, it is necessary to get a clear picture of the peculiar circumstances under which oil and gas exist underground, and the peculiar characteristics they possess not shared by other species of property. These circumstances and characteristics are understood and accepted by all informed members of the industry as follows:

(1) Oil and gas exist in the ground in porous rocks, including sandstones, limestones and other formations, and are usually held in place or confined beneath an impervious shale or clay above water, the enclosure being thus referred to as a reservoir or pool.

(2) They exist in their undisturbed state under pressure, often very high, and are so trapped as not to escape unless the impervious formation above the reservoir be in some way fractured or broken or pierced by a hole.

(3) In such pools both oil and natural gas are encountered as occupants of the same reservoir.

(4) There often is found a quantity of free gas occupying the higher portions of the reservoir, such gas lying above and in contact with the oil contained in the reservoir, and due to its expansibility in all directions exerting a pressure throughout the whole reservoir.

(5) In addition to such free gas, large quantities of gas are usually found in the reservoir in the oil contained therein, which association between the oil and gas reduces the viscosity of the oil and otherwise tends to increase the mobility so that, when the reservoir is penetrated by a well, the propensity of the oil to migrate to the opening thus created and to be lifted to the surface is augmented, and its freedom of movement toward areas of lowered pressure increased.

(6) The expansibility of the free gas contained within the upper portion of the reservoir and of the gas dissolved in the oil therein constitutes what is

known in the oil industry as the gas energy of the particular pool, and when the reservoir is penetrated by a well, the expansibility of the gas propels the oil into the well and lifts it to the surface for recovery for commercial purposes.

(7) Until such time as the gas pressure in the reservoir is dissipated through the wells drilled into the reservoir, the oil and gas continue to flow through the wells when open.

(8) There usually are found in the reservoir beneath the gas and oil large quantities of water, existing under pressure and exerting a force laterally and vertically against the oil and gas; and as oil and gas are removed through wells penetrating the reservoir, the water forces them forward and moves in to take the place of the oil and gas removed, exerting a pressure thereon and aiding the gas energy in moving the oil into the wells and in forcing the oil to the surface. Often the pressure exerted by the water is a prime source of energy.

(9) As the pressure in the reservoir is lowered by the removal of oil and gas from the reservoir, the viscosity of the oil is increased and the oil becomes more difficult to move through the pores of the reservoir rock to the well, so that as the process of removing the oil continues the reservoir energy is lowered and the amount of energy required to move the oil is increased.

(10) Both gas and water tend to move toward any area of lowered pressure at a more rapid rate than oil, particularly oil of high viscosity, and if the pressure is unduly reduced through the rapid withdrawal of oil or gas, the tendency is for the water to by-pass the oil, particularly that oil in the less permeable parts of the reservoir, channeling through the oil-saturated sections of the reservoir, coming up into the oil-saturated section and thus trapping off the oil and preventing its recovery by the best devised production methods now in vogue. This condition is aggravated both by withdrawals of oil and gas from the field as a whole and by unequal withdrawals from localized areas as against equalized withdrawals over the field under relatively

uniform pressures. The maximum recovery of oil is secured by the maintenance as long as possible of the gas supply in the pool and of relatively high and relatively uniform pressures throughout the reservoir, preventing the rapid encroachment and channeling of the water existing beneath the oil and exerting a pressure against same.

(11) The force of the water and gas in a reservoir is exerted throughout the same, and the gas and water energy are the common agencies by which all operators in the pool are permitted to recover their oil, and the undue lowering of the pressure affects recovery throughout the field, and the dissipation and waste of gas in any area adversely affects the recovery throughout the pool. The movement of gas, oil and water toward an area of lowered pressure created by the penetration of the reservoir by a well is not affected by conditions, and the oil coming to the surface through a well located in one area may be drained from beneath adjacent areas, and the water drawn into the oil-and-gas-saturated section of the reservoir may entrap and cause waste of oil under the area on which the well is located and also in adjoining areas.

(12) When the gas energy and the water energy or drive operating as described are so far dissipated as to be insufficient to lift the remaining recoverable oil to the surface, it can be produced, if at all, only by pumping or other artificial means, adding to the expense and increasing the cost to the consumer. A more serious situation exists when the energy is dissipated to the extent that oil cannot be moved to the wells. Pumping or other lifting equipment does not help that situation.

9. Summary

It will be seen from the foregoing that serious preventable physical waste would result from separate ownership of oil and gas if separate ownership conceivably were possible. Inasmuch as the ownership of oil and gas depends upon the meaning of the word "petroleum", the relationship of semantics to practical oil production

and physical waste of oil and gas is clear. It has been demonstrated that:

(1) by 1900 as today, the composition of petroleum was known and the fact was well established that petroleum contained natural gas as well as oil;

(2) by 1900, as now, oil and natural gas were known to be of common origin and occurrence;

(3) by 1900, as now, the anticlinal theory of the occurrence of oil and natural gas was well established and verified;

(4) by 1900 the consequence of (1), (2), and (3) above was that oil and natural gas are petroleum, and petroleum is oil and natural gas;

(5) today the sciences of petroleum and geological engineering require that natural gas be handled properly and utilized and controlled if maximum recovery of oil is to be achieved. The practical consequence of this requirement is that the production of natural gas must always be incidental to the production of oil if maximum recovery of oil is to be attained, so difficult is the job of producing oil, and so easy it is to produce natural gas; and

(6) separate ownership of natural gas and oil is impractical and always has been so and is contributory to irretrievable physical waste underground of a great natural resource and therefore is against the public interest.

Q Dr. Fancher, there is just one matter that I thought perhaps we might make a little clearer. Yesterday you were reading from an authority with regard to some matters, and it was late, and we were reading that rather hurriedly, and I would like to put this question to you: Is it quite clear from the literature that you have studied that prior to 1906 the use of gas as the propulsive force to bring the oil to the surface in the operation of a well was well known and was used in practical operations in Canada and the United States? A. Yes, sir, it was.

MR. STEER: My lord, with the permission of your lordship and my learned friends' consent, I would like to ask that the cross-examination of this witness be divided. I should like to deal with his references to literature, and my friend, Mr. Riley, will deal with the rest of the cross-examination.
THE COURT: What have you to say, Mr. Helman?
MR. HELMAN: No objection.
MR. NOLAN: No objection, my lord.
THE COURT: Before you start, I think we will adjourn for 15 minutes.

(Hearing resumed after short adjournment.)

THE COURT: Have you finished, Mr. Helman?
MR. HELMAN: Yes, my lord, I have finished.
THE COURT: All right, Mr. Steer.

CROSS-EXAMINATION BY MR. STEER:

Q Dr. Fancher, what I have to discuss with you is this question of Canadian literature with reference to oil and natural gas. Now, I take it this Exhibit 124-B is simply a list taken from the Canadian references in Exhibit 124, am I right in that? A. Yes, sir, the references to the Canadian industry.
Q Yes. And is intended to be comprehensive? A. Only to the extent that the bibliography itself is comprehensive.
Q I see. So that what you intended to do was to take out of Exhibit 124 all references to Canadian literature dealing with this industry? A. Yes, sir.
Q Is that right? A. References to the Canadian industry.
Q And in your exhibit which you have just finished reading you have got a list of the authorities there on the very last page in Exhibit 122? You have got a list of references there on the last page, is that right? A. Yes, sir. These were referred to specifically. I used their names in the text.
Q Quite so. A. And these simply are the references.
Q I suppose you have read all those references that are given in Exhibit 122, have you? A. What is Exhibit 122?

Q That is the book that you have just finished reading. Those references that you have read on the last page, you have read them all? A. I haven't read them all in the original; I have read excerpts or references to them.

Q In other books? A. In other books, yes, sir.

Q Quite so. A. I have read some of them myself.

Q And among those I notice you refer to Sterry Hunt?

A Yes, sir.

Q A big name in Canadian geology? A. Yes, sir.

Q And I also notice that on page 845 of your exhibit 123 there appears a reference to Hunt, T. Sterry, 1861, History of Petroleum or Rock Oil, and I do not see that reference in this list you have given us as Exhibit 124-B. A. What page?

Q 845 of Exhibit 123, a little less than half way down the page, Hunt, T. Sterry, on the History of Petroleum or Rock Oil, and I do not see that in your Exhibit 124-B. It is not there, is it? A. No, sir.

Q Any explanation? A. Yes, sir. I had started to read these from here, and I was asked last night to prepare these and I did, and I overlooked it in the rush last night.

Q I see. A. It wasn't omitted intentionally, if that is what you mean.

Q All right. Now then, you made a statement just at the close of your examination to the effect that the function, as I understand it, the function of gas in the production of oil was well known in Canada prior to 1906. I wonder if that is your statement?

MR. HELMAN: That is not the question, Mr. Steer, nor the answer. I just rise to correct that. It was with regard to gas as the propulsive force to bring oil to the surface.

MR. STEER: Perhaps I will get the stenographer to read the question and answer.

BY THE REPORTER (reading):

"Q. Dr. Fancher, there was just one matter that I thought perhaps we might make a little clearer. Yesterday you were reading some authority with regard to some matters, and it was late and we were rushing that rather hurriedly, but I would like to put this question to you: Is it quite clear from the literature that you have studied that prior to 1906 the use of gas as the propulsive force to bring the oil to the surface in the operation of a well

"was well known and was used in practical operation in Canada and the United States? A. Yes, sir, it was."

Q MR. STEER: Now, will you tell me, Dr. Fancher, on what authority you base that statement?

A Did I make that statement, sir? Which statement are you referring to?

Q The statement which the reporter just read to you, Dr. Fancher. A. I mean, does that purport to be a statement in my report?

Q It is your evidence here under oath, Dr. Fancher.

A I wish you would point it out to me.

THE COURT: It is your answer to Mr. Helman right at the close, the very close of your evidence, Dr. Fancher.

A Oh, I thought it was in the report.

Q Probably Mr. Howard, the Court Reporter, will be happy to read it to you. Mr. Helman put this question to you, and you gave the answer as the Reporter is going to read it to you now.

BY THE REPORTER (reading):

"Q. Dr. Fancher, there was just one matter that I thought perhaps we might make a little clearer. Yesterday you were reading some authority with regard to some matters, and it was late and we were rushing that rather hurriedly, but I would like to put this question to you: Is it quite clear from the literature that you have studied that prior to 1906 the use of gas as the propulsive force to bring the oil to the surface in the operation of a well was well known and was used in practical operation in Canada and the United States? A. Yes, sir, it was."

A My answer to that question was predicated on the very fact that T. Sterry Hunt is the father of the anticlinal theory and this theory is based upon the gravitational segregation of the fluids and the close association of both oil and of gas.

Q MR. STEER: I see.

A T. Sterry Hunt is a Canadian authority.

Q Quite so. Now, I should tell you that what I have to discuss with you is based on a statement on page 2 of Exhibit 122 to this effect:

"A study of the literature on petroleum, including oil, gas, and related systems of hydrocarbons, from earliest times to 1950, and ranging from casual references to complete treatises, natur-

"ally discloses apparent disagreement as to the meaning and shades of meaning of the word 'petroleum', particularly to those who know little of the petroleum industry. However, it must be emphasized that the usage of any word depends upon the background of the user."

And then you add:

"Fortunately the word 'petroleum' is a technical term and hence is used more precisely by the technologist and less precisely by the relatively less well informed."

I suppose you would say, Dr. Fancher, that the word "Petroleum" is no more technical than the words "mines and minerals"? A. Well, I do not know that I would be able to compare them precisely.

Q Is that the best answer you can give me? You understand my question, Dr. Fancher? A. Yes, sir, you are asking me to compare two different expressions.

Q No, but, Dr. Fancher - A. Exactly -

Q If you will excuse me. You were making a categorical statement here, that "Petroleum" is a technical term, weren't you? A. Yes, sir.

Q Now, the expression "mines and minerals" is or is not a technical term? A. Well, I would say it is.

Q It is a technical term? A. Yes.

Q Very well. No more and no less technical than the word "petroleum"? A. Well, I wouldn't know about the "no more or no less", because exact comparison is difficult.

Q Is "asphalt" a technical term? A. It is to the technical man.

Q Oh, yes, of course. Is it to the man on the street?

A Well, he probably would not be aware of it.

Q And I suppose petroleum is in the same category, the man on the street would not use it in any technical sense at all, would he? A. Whether he would or not would depend on the extent of his education, I suppose.

Q Well, we are talking now about the difference between technical people, by which I take it we mean highly trained scientific people, am I right? A. By trained scientific people.

Q Yes. And we are comparing that with the man on the street, which is the man who has the ordinary run of education, and I ask you whether the man on the

street would regard either asphalt or petroleum as technical terms? A. The man on the street certainly would not import all the shades of meaning to a specific word, that is, its exact meaning in the technical sense that the technologists would.

Q The likelihood is that the man on the street would regard asphalt as the stuff that they pave roads with? A. If that is the extent of his knowledge of asphalt, yes, sir.

Q And it is likely that the man on the street would regard petroleum as crude oil from which we get motor fuel and lubricating oil? A. Would you repeat that to me, please.

BY THE REPORTER (reading):

"Q. And it is likely that the man on the street would regard petroleum as crude oil from which we get motor fuel and lubricating oil?"

A. That would depend on what you mean by the man on the street.

Q MR. STEER: Yes.

A If the man on the street had worked in the oil industry, particularly in the production branch, he might have a different concept of the word "petroleum".

Q Yes. Now, Sterry Hunt is a high authority, you have told us that? A. Yes, sir.

Q And Sterry Hunt wrote a book in 1863 called "Geology in Canada", did he? Do you know this book (indicating)? A. No, sir.

Q You have never seen it? A. I probably have seen it in libraries, yes, sir.

Q But you do not know it? A. No, sir.

Q I see. Well, it is a book published by the Geological Survey of Canada, and its title page reads: "Report of Progress from Its Commencement to 1863, Illustrated by 498 woodcuts in the text." You will take a look at this book, Dr. Fancher, will you? And you have seen reports of the Geological Survey of Canada? A. Yes, sir.

Q You have? A. Yes, sir, I have seen quotations from it.

Q And you recognize that as an authentic report of the Geological Survey of Canada? A. Oh, certainly.

Q Certainly? A. Yes.

Q And I would like to call your attention to the title page, the names of the officers of the Survey. Sir William E. Logan, is that name known to you?

A I believe I referred to him.
Q I believe you did, but do you know the name, Dr. Fancher? Was he a big man in the development of geology in Canada? A. I would assume as Director of the Survey -
Q He would be? A. He would be qualified, yes, sir.
Q And then there is Alexander Murray, and the next name is T. Sterry Hunt? A. Yes, sir.
Q And I would like you to comment, if you will, on this passage which I took from that book. A. Yes.
MR. STEER: Now, my lord, I have got quite a few passages to read. We were not aware that we might file photostatic copies of these passages for the convenience of all concerned, the court and the counsel on the other side. We would be very happy to have these photostatic copies prepared and filed, if that is the course that is thought desirable. On the other hand, it may be that by reading them into the record that might be sufficient.
THE COURT: Well, what do the other counsel desire?
MR. NOLAN: My lord, I read mine into the record. I did not file them as separate exhibits. My friend, Mr. Helman, did file his as separate exhibits.
THE COURT: Would it be all right if they are read into the record, Mr. Helman?
MR. HELMAN: I am entirely in your lordship's hands. I have no objection to that procedure.
THE COURT: Well, I think you ought to express yourself because I do not want anybody to go to the next court, and I am sure this case will go to the next court, as sure as I am sitting here, I do not want anybody to go there and say, "Now, we did not get copies of what was read into the record and we, therefore, did not have an opportunity of cross-examination," so that I think you had better say whether or not you are satisfied.
MR. HELMAN: I had no intention of saying I was not satisfied. I am perfectly satisfied whichever course is adopted.
THE COURT: You might not be counsel in the next court and somebody else might say so.
MR. HELMAN: Well, on behalf of my clients, my lord, I entirely waive any objection to

whatever method Mr. Steer wants to present this to your lordship.

THE COURT: Well, I think you can read them into the record as Mr. Nolan did.

MR. STEER: Very good, my lord.

Q Now, the people who were responsible for this volume, Dr. Fancher, you understand, were the officers of the Survey named in the title page? A. Yes, sir.

Q And it is unnecessary, perhaps, for me to identify who wrote the particular article because I would take it that they are all equally authoritative, produced as they are in this volume? A. Well, I would like to know who the authors are, yes, sir.

Q I see. I will just call your attention, and I do not want to have to go through this whole preface, but there is a preface here of some 16 pages signed by W.E. Logan? A. Yes, sir.

Q And that preface indicates that Logan, Sir William E. Logan, gives his approval to the volume?

A Yes, sir.

Q Is that sufficient for your purposes? A. Well, may I ask a question?

Q Certainly.

THE COURT: A little louder, Mr. Steer, I can not hear the two of you.

MR. STEER: Yes, my lord.

A Is this volume made up of chapters or manuscripts prepared by different individuals?

Q Yes. A. Aren't they identified? I mean, a quotation from a definite article is usually associated with an author?

Q Yes. Well, I am bound to say that up to this moment I was under the impression that T. Sterry Hunt was the author of that volume. I am now told that that is not so, and it may be necessary for me to segregate the articles. I think probably the simplest course would be if I postponed for the moment my treatment of this volume of 1863 and go on with something else. What I have here is another report of progress of the Geological Survey of Canada, Sir W.E. Logan, Director. You recognize that, do you?

A Yes, sir.

Q And this one, apparently, has been got up in a much more accessible form, because we have got here chapter 7, Dr. Fancher.

MR. HELMAN: What is the date of that?

MR. STEER: 1863.

Q We have got chapter 7, report of T. Sterry Hunt, commencing at page 181 and going on? A. Yes, sir.
Q And the passage to which I am now about to refer you is at page 259 of that volume, Dr. Fancher, and it reads thus:

"The relations of gas and of saline waters to the oil are very simple. These substances, being present in the strata, accumulate in the same fissures, and escape by the same openings as the petroleum."

Now, when Dr. Hunt used that language he was identifying oil and petroleum, was he not?
A Yes, sir.
Q And he was treating petroleum and gas as separate substances, was he not? A. Would you repeat that there, or could I see it a minute, please, sir?
Q Yes, by all means. It is just the first three or four lines, Dr. Fancher. Do you agree? A. Yes, sir, he says oil and gas there.
Q And he says they are separate substances, doesn't he, impliedly? A. He used two words for it, yes, sir.
Q And he goes on to say that they:

"accumulate in the same fissures, and escape by the same openings as the petroleum, without, however, having with it any necessary connection whatever."

That means that there is no necessary connection in Dr. Hunt's mind between the gas the oil, doesn't it? A. Well, if you draw that inference it is inconsistent with the close association that he has indicated in the first sentence.
Q Well, you are not disputing that he said it? He did say it, Dr. Fancher, didn't he, just as I read it to you? A. Well, I do not know whether the word "connection" refers - and I can not tell from this sentence - refers to the relationship of petroleum to the, or oil to the gas and saline waters, or whether it refers to the fissures.
Q I see.
MR. HELMAN: May I see that book?
MR. STEER: Just one moment.
Q We will go over it again. I hope we do not have to take as much time over every sentence.

"The relations of gas and of saline waters to the oil are very simple."

No doubt about that? A. That is clear.

Q "These substances - "
What substances? A. That means oil. I mean, the gas.
Q And the saline waters to the oil? A. Yes.
Q "These substances, being present in the strata, accumulate in the same fissures, and escape by the same openings as the petroleum."
Now, he uses petroleum there as a synonym for oil, which he has used above, doesn't he? A. Yes, he does.
Q And so it is the gas and the saline waters whose relationship to the oil he is discussing, which escapes through the same fissures, which accumulates in the same fissures and escapes through the same openings as the petroleum, that is right, isn't it?
A He says that the three fluids escape through the same openings.
Q Yes. And then he goes on to say, without referring back again to the gas and the saline waters:
" - without, however, having with it any necessary connection whatever."
Now, isn't that the plain and obvious meaning of those words? A. No, sir.
Q It is not? A. It is not clear to me. I am sorry.
Q All right. What is the meaning of the word "it", "without, however, having with it any necessary connection whatever", with what? A. Do you want the antecedent of "it" in that?
Q Yes? A. That is what is not clear to me.
Q All right, I will go on.
"The gas, which is light carburetted hydrogen, or marsh gas, is probably generated from other strata, and in other conditions than those which have given rise to petroleum."
Dr. Hunt said that, didn't he? A. Yes, sir.
Q And that does not involve the presence in the same strata of petroleum and natural gas, does it?
A I take that to mean that he indicates that in his opinion there might be a different source. I do not know that it implies that in a pool they are not intimately associated.
Q What do you mean by a different source, Dr. Fancher?
A A different - evidently he is talking about a different source bed, or a different source of the gas as distinct from the oil.
Q Why should you say "different source bed" rather than "different rocks"? A. Well, the term we usually use is "source bed".
Q All right. He does not say "source bed". He says that:

"The gas, which is light carburetted hydrogen, or marsh gas, is probably generated from other strata."

Other strata than what? Than those in which the petroleum is generated? A. Yes, sir.

Q That is what it means? A. Yes, sir. That is what I said, "other source bed".

Q Do you mean now the decomposition of the matter that produces this gas and the decomposition of the matter that produces oil, and do you mean that those take place in different source beds, is that what you mean? A. That seems to be what he may have meant.

Q I see. A. His knowledge of that was incomplete.

Q His knowledge was incomplete? A. With respect to the origin.

Q Well, you have learned a lot about it since 1866, of course.

"The gas, which is light carburetted hydrogen, or marsh gas, is probably generated from other strata, and in other conditions than those which have given rise to petroleum."

Now, what you tell me is, that in your view what Dr. Hunt is saying, that you go to some source bed and there you get marsh gas generated, and you go to other source beds and there you get petroleum generated, is that right? A. Yes. He did not know how either was generated, but he suspected.

Q Do you? A. What?

Q Do you? A. We know pretty well, yes, sir.

Q Well, what do you know, and how did you find out? It is all speculation, isn't it? A. It is deductive reasoning.

Q Pardon? A. It is deductive reasoning.

Q I see. But what happened below the surface of the earth to bring about these phenomena, natural gas and the other things connected with it, asphalt and that sort of thing. We have got no definite knowledge at all? A. All our concepts in the field of science are based on deductive reasoning.

Q Yes?

MR. HELMAN: Would you let the witness answer the question.

Q MR. STEER: Have you finished?

A Yes, sir.

Q I thought you had.
MR. HELMAN: He had his mouth open as though he were going to say something more.
Q MR. STEER: If Dr. Hunt thought that marsh gas was the result of the decomposition of animal and vegetable matter laid down in marine beds at a certain stage of decomposition, and if he thought that following that stage there was another stage in which other gases were added to the marsh
10 gas, and if he thought that at other stages of decomposition of that matter petroleum was formed, there is not anybody living today who can deny the accuracy, who can dispute absolutely that that is the way these things develop, is there? A. Oh, yes, sir.
Q How do you know? A. I might save a little time while we are discussing this to say the date of this publication is 1860, is it?
20 Q '66. A. '66?
Q Yes. A. And he said in this report that by 1900 we had a pretty clear conception of the theories regarding the origin and accumulation of petroleum, and I cited Dr. Hunt's contribution to that store of knowledge which I found was available by the year 1900 with respect to his formulation of the anticlinal theory, which could not have been conceived unless the author had in mind the thought that in a petroleum reservoir oil and gas and water
30 are in intimate association.
Q And so in every petroleum reservoir you are going to find - - A. May I finish. I did not cite him as an authority on the genesis of petroleum.
Q Yes. But you would not dispute the fact that on the passages I read to you that Dr. Hunt - -
A No, sir.
Q Just a minute. Perhaps Mr. Helman will ask you not to interrupt me. A. I beg your pardon, sir.
Q You would not dispute the fact that when this book
40 was written by Dr. Hunt in 1866 he regarded natural gas and petroleum as two separate substances, will you? A. From that citation I would say he regarded the two as coming from different sources.
Q Well, that is perhaps sufficient. He goes on to say:
"....and in other conditions than those which have given rise to petroleum, and,....."

I beg your pardon - -

"....and in other conditions than those which have given rise to petroleum, and, indeed, it most abounds in coal-bearing rocks, where petroleum is generally absent. It is sufficient to say that while a peculiar decomposition of organic matters gives rise at once to coal, and marsh gas, a different transformation of the same matters might yield petroleum, which contains the elements of the two united."

You understand that? A. Yes, sir.

Q As being Dr. Hunt's view at that time? A. Yes, sir.

Q And that, of course, says that petroleum and natural gas were two distinct things coming from different sources, doesn't it? A. It says there from different sources, yes, sir.

Q "This general remark applies to marsh gas, which is evolved in great quantity from very many fossiliferous strata. A portion of the elastic fluid from the oil wells, however, probably consists of other gaseous hydrocarbons richer in carbon than marsh gas."

But still gas, is that right? A. Yes, sir, we have had that. We know that.

Q Yes. Now,

"The presence of this gas....."

he goes on to say,

".....imprisoned in the strata, often plays an important part in oil wells, since, by its elasticity, it exerts a pressure which forces the oil from the fissures where this has accumulated."

I call your attention to the word "often"? A. Yes.

Q He does not say it always does, is that right?

A No.

Q Nor does he say that you would not find natural gas in a place where there is no oil on which it will operate at all? A. No, he does not say that.

Q ".....and which may be supposed to be in part filled with the compressed gas. At Petrolia, there were formerly two flowing wells, which for many months had given a supply of oil, interrupted only, from time to time, by the discharges of accumulated gas. Last year, however, a boring in their vicinity, opened a great reservoir of gas, and from that time

"they ceased to flow."
Now, that is a recognition of the part that gas may play in the production of oil, isn't it? A. The part that it does play, yes, sir.
Q Yes. Invaluable? A. I can not testify to what is not there.
Q Invariably this gas, invariably it does play a part in the production of oil? A. Play a part?
Q Yes? A. I know of no place where it does not play some part.
Q What do you mean by that? That it is a part of the propulsive force in every well that produces oil on this continent, do you say that? A I have testified that all crude oils produced are accompanied by natural gas to some extent.
Q That is not what we are talking about. A. And that gas is so intimate in association with oil as it comes through the channels of the rock that it necessarily plays a part.
Q And is it your evidence, Dr. Fancher, that there is no well on this continent producing oil where gas does not play a part in the production of the oil?
A I know of no place where oil is produced without some gas. It may be that the amount is small in many instances.
Q Yes. I am not talking about oil, about gas being produced with the oil. I am talking about the propulsive force of the oil, I am sorry, of the gas as being necessary to bring the oil to the surface.
A You mean, within the well bore?
Q Yes? A. But we have many instances where the amount of gas produced at some time during the life history of individual wells, and even in fields, we are talking about wells, individual wells, is insufficient to lift the oil to the surface.
Q Yes. I gathered that from your evidence here a little while ago with regard to these diagrams.
A Yes, sir.
MR. STEER: Now, my lord, I did not adopt a very good method, I think, of dealing with these matters, and from now on I propose, with your lordship's approval, to read the passage to which I want to refer first after identifying it, and then to examine Dr. Fancher on it.
Q I am showing you here, Dr. Fancher, a report of the Geological Survey of Canada, 1890-'91, Volume 5, Part II, which I take it you recognize, is what it

purports to be? A. Yes, sir.

Q And there is a report in here called "Report Q" and the title page reads:

"Report on Natural Gas and Petroleum in Ontario prior to 1891",

and the author is H. Peareth H. Brumell, F.G.A. Did you ever hear of Mr. Brumell? A. No, sir, not to my knowledge.

Q I see. And I shall read some passages from the introduction. The first paragraph on page 5-Q of the report:

"The object of this report is to give in a concise form a description and narrative of boring operations undertaken in the Province of Ontario, up to and inclusive of the year 1890, all wells sunk, whether searching for salt, petroleum, natural gas or water, have been included. These operations show that there is in Southern Ontario, that is, that part lying southwest of a line drawn from Georgian Bay to Kingston, a possible thickness of paleozoic rocks, and including the drift, of 4200 feet as follows."

Now, I pause there, and I ask you whether the author of this report regarded petroleum and natural gas as separate substances when he used the language:

"all wells sunk, whether searching for salt, petroleum, natural gas or water have been included."

Did the author of that language regard petroleum and natural gas as separate substances? Would you like to look at it? A. Yes, sir. I see better than I hear, I believe.

Q That might quite well be, Doctor. The first paragraph? A. Yes, sir. Well, looking at the title, this is a statistical report, and I take it this article is concerned with these borings and to no doubt classify these explorations according to what was found. It is like we classify a well as a dry hole or an oil well or a gas well, or a salt water well, after the thing is done. And I imagine that he got his classification from the survey and he classified those wells in that manner.

Q Of course, he described the wells, Dr. Fancher, as wells sunk, whether searching for salt, that is one substance, isn't it? A. Yes, sir.

Q And then another well sunk searching for petroleum,

and that man had another substance in mind, did he not, who was searching for petroleum? Petroleum is not salt, is it? A. Are you asking me, please, sir?

Q I am just asking you. A. To say that this author had knowledge of the objective of the prospector for each one of those?

Q Yes, I am suggesting that to you. A. I can not tell from that.

Q I see. So that you are not prepared to say that the author of this language, when he says:

"all wells sunk, whether searching for salt, petroleum, natural gas or water,"

is talking about a number of different things? You are not prepared to say that? A. He is talking about a number of different objectives.

Q And what is the objective of the first one? A. What is the objective of the first boring that he talks about, sir?

Q What is the objective of the first boring that he is talking about? Is it salt? A. I just said I could not tell what the objective of the undertaker was. That is a matter of classification.

Q You are not prepared to say? A. There is not enough information there.

Q I see. Well then, I propose to read you another paragraph here. This is paragraph 3 on page 5-Q:

"The question of the origin of the hydrocarbons has not been gone into to any extent, though in Part I of this report the salient points in the many theories advanced are given."

That is as to the origin of this in 1890? A. Yes, sir.

Q "It is now earnestly requested that drillers and others interested in boring operations throughout Canada should enter into correspondence with this office, that the information thus available may be made as complete as possible."

And then I read you a further paragraph:

"Throughout this report the term petroleum -"

and then in parenthesis:

"(rock oil, mineral oil, etc.) - "

completing the parenthesis,

"is understood to refer to that mineral in its broadest commercial sense, and to include all varieties of the mineral in its fluid or semi-fluid state."

A Yes, sir.
Q Now, I take it there that he is referring to petroleum oil and a semi-fluid substance which some of us have here described as maltha, would that be right?
A Would you either read me the exact words or let me see it, please.
Q Oh, yes. Perhaps it would be better if I stood over here. This is it down here (indicating). A. Yes, sir. Now, you know as well as I do that the word "fluid" includes both gaseous and liquid states, and I would agree with that statement, yes, sir.
Q You agree with that statement? A. Yes, sir.
Q Very well. A. That includes both liquids and gases.
Q Very well. And then I read you this on the next page - you are suggesting that the word "petroleum" is used there to include the liquid, gaseous and semi-fluid substances, is that right? A. The different fluid states of petroleum.
Q And that includes gas, in your estimation, in the language of this author, is that right? A. Gas as a fluid, yes, sir.
Q I see. Well then, having defined petroleum in the way he has done, on page 6-Q I read you this:

> "Natural gas is understood to consist essentially of marsh gas with small quantities of hydrogen, nitrogen, etc., and to have a gravity compared with air of from .560 to .850."

And then he goes ahead and gives an analysis of natural gas. If your proposition is correct, there wasn't any necessity to go on and define natural gas, if natural gas was a part of this petroleum, was there? A. Sir, I can not tell just by a sentence or a paragraph here and there what the connection is.
Q Here is the book. A. Yes, sir. It appears that he has made a classification for the purposes of this report.
Q Of natural gas and petroleum and two separate substances, hasn't he? A. Yes, sir.
Q That is right? A. Yes, sir.
MR. HELMAN: Will you let me see the book, please.
MR. STEER: Just one moment.
Q And then I am going to read you from this same report, this report is "Report Q". Oh, I beg your pardon.

What I am reading now is from "Report S" in this same volume, and it is one which purports to deal with mineral statistics and mines. That is "Report S"? A. Yes.

Q By Elfric Drew Ignall? A. Yes, sir.

Q And I would like to call your attention to the fact that this report throughout is dealing with all the different minerals that are found in Canada, is it not? A. Well, I do not know whether it includes all that is found. Yes, sir, it does deal with minerals.

Q It purports to be a report on - A. Mineral statistics.

Q On mineral statistics and mining? A. Yes, sir.

Q And there is a section of that report devoted to each of the individual minerals, is that correct?

A That appears to be correct.

Q That appears to be correct? A. Yes.

Q Then I would like to refer you to page 102-S where we have a section on natural gas? A. Yes, sir.

Q And there is a description of what has been done in the way of developing natural gas over to page 110-S?

A Yes, sir.

Q And then we have got a section dealing with Nickel?

A Yes, sir.

Q And then we have got a section at page 120-SS dealing with petroleum? A. Yes.

Q And the man who prepared that report on the Mines and Minerals of Canada regarded petroleum and natural gas as two separate substances, did he not?

A Yes, sir. The statistics on gas and the statistics on petroleum are by different authors, are they not?

Q Yes, that might easily be. A. No, they are not. I am sorry. They are the same. I had the wrong page.

Q And when you come to petroleum, there are statistics there given and the statistics are given in barrels, aren't they? A. Yes, sir.

Q Or gallons, I should say. They are given in there in gallons or barrels? A. In barrels.

Q In barrels? A. Yes.

Q Yes? A. And the gas is in cubic feet.

Q Yes, quite so. Not so much in cubic feet, I think, perhaps as in dollar value? A. I thought I saw cubic feet there.

Q I doubt if you will find it, but it may be. Well now, I show you, Dr. Fancher, the 1892-1893 Report

of the Geological Survey, and you would recognize this as that report, would you not? A. Yes, sir.

Q And then I turn to the beginning of page 4-S, and you look at the title page, and we have got our mineral statistics and mines again? A. Yes, sir.

Q And we go over to 102-S and we get a discussion on natural gas, is that right? A. Yes, sir.

Q And then we go back up it, or rather, we go forward, and we come to nickel, and then finally on page 114-S We come to petroleum, with nickel intervening?

A Yes, sir. The gas is reported in cubic feet, and what he calls petroleum - I also see down here crude oil is reported in barrels, I believe, as well as dollars.

Q Well, you see it is gallons. A. Oh, yes, gallons.

Q You see it is gallons used here? A. These are products, production of Canadian oil refineries.

Q I thought - A. This is a report of refined products, isn't it?

Q No, it is a report of the mines. A. No, I mean, the petroleum here, a report of refined products.

Q That may be. All I am interested in is the fact that the gentleman who wrote that book regarded petroleum and natural gas as two different substances, that is right? A. No, sir, refined petroleum products. He distinguished and differentiated. There may be the crude oil in there, but I did not pick it up. I did not have time.

Q You do not dispute that what is being given in this report is a list of the minerals that are found in Canada, how comprehensive you do not know, is that right? A. I do not dispute that the title says this is a report on minerals.

Q Well then, will you look at the report, and will you tell me whether from the beginning throughout this discussion, whether it is a discussion of various mineral substances? A. Mineral substances and products produced from minerals.

Q Dr. Fancher, will you please do what I ask you to do and let me know whether that report is a discussion of various mineral substances? You will have to find that from this page ( indicating). A. You mean, from the title page?

Q No, I do not mean from the title page. Perhaps I can simplify things. It relates to mineral statistics and mines, doesn't it? A. Yes, the title.

Q I may have to read you some of this now. This is the letter of transmittal from Mr. Ingall, the author of the report:

"I beg herewith to hand you the report of this division on mining and mineral production throughout the Dominion during 1892."

He is dealing with minerals, isn't he? A. That is the sentence there.

Q I beg your pardon? A. That is what that sentence says.

Q "As in past years, it will be found to represent as complete a review of the mineral activities of the country and of their commercial results as it is possible to obtain with the means at command."

Talking about minerals, isn't he? A. And commercial results.

Q Commercial results, sure. And then on page 5-S I find that he has a table which is headed: "Summary of the Mineral Production of Canada in 1891 and 1892," then he gives a list of metallic minerals, copper, gold, iron ore, lead, nickel, platinum, silver, and gives the value of the production.

A Yes.

Q And then he gives a long list of non-metallic minerals and in these is included natural gas to the value of $150,000.00, is that right? A. Yes.

Q And petroleum in barrels, it shows 55,298 barrels. Do you still agree that we are talking about minerals? Are we, Dr. Fancher? A. Sir, I would have to look at that and see from what source in the book that figure in the table came.

Q All right. He goes on and at page 12-S discusses the production of asbestos in Canada? A. Yes.

Q That is a mineral? A. Yes.

Q And then he discusses coal? A. Yes.

Q That is a mineral, is that right? A. Yes, sir.

Q And then he discusses copper? A Yes, sir.

Q That is a mineral is that right? A. Yes, sir.

Q And graphite? A. Yes, sir.

Q Is that a mineral? A. Yes, sir.

Q And gypsum? A. Yes, sir.

Q That is a mineral? A. Yes, sir.

Q Now, we go right through and, as I say, we come eventually in alphabetical order to natural gas, nickel and petroleum, and we have the same statistics with regard to the lot, and I ask you whether the

author of this report regarded natural gas and petroleum as separate substances? A. Sir, when I look at the portion that is entitled "petroleum" in the report, I do not know about the others because I have not looked at them, but you did show me the section on petroleum, and the statistics that I see there are for refined products, and the author makes reference to that in the first paragraph.

Q Well, I suppose before the refined product could be produced that the crude had to be produced, did it, and I do not disagree that those are refined petroleum products, but I want to ask you is the crude petroleum from which the refined petroleum is obtained regarded by the author of that report as a mineral? A. I would not know about that, sir.

Q I see. And you are not prepared to say whether or not the author of this report regards natural gas as a mineral? A. Yes, sir, he puts statistics in there.

Q And why do you say he regarded natural gas as a mineral and he did not regard petroleum as a mineral? Just because there are some figures here with regard to refinery production? A. You asked me the question about natural gas, and I looked at the section on natural gas, and found he said that this gas to this amount was produced, or words to that effect.

Q Now, I am going back, Dr. Fancher, to Report "A". I need not refer further to that. Now, there are some passages here I would like to refer you to. This is the Annual Report of the Geological Survey of Canada, 1894? A. Yes.

Q You recognize that as being what it purports to be?

A Yes, sir.

Q I am going back to the preceding volume for just a moment. My attention is called to the fact that while it is clear, as you suggest, the opening paragraphs have to do with refinery operations, yet over here on page 110-S you have got Canadian oils and naphthas imported, and corresponding quantities of crude oil, is that right? A. Yes, sir, that is the title.

Q And he is dealing with crude oil? Q. Yes, I did not have time to turn to this page.

Q Yes, but he is dealing with crude oil? A. Yes,

he has included statistics on crude oil and refined petroleum products under the heading of "Petroleum".

Q Yes. A. Which is, I would take, a proper use.

Q Yes. And then including natural gas in the same volume indicates that the author regarded the two as separate substances, would I be right in that?

A He put it in a different portion of the book.

Q He puts them into a different portion of a book dealing with individual minerals found in Canada, is that right? A. No, sir, not with individual minerals necessarily. I think that we would find possibly there examples where the word "mineral" in that book, where mineral is not used in the strict sense of the word.

Q I see. A. I mean, for example, you mentioned copper to me. Well, I do not know myself whether native copper is found in Canada; I know it is in Northern Michigan, and when it is found it is properly classified as a mineral, but if the statistics in there refer only to copper produced from ores of copper, the term "copper" there could not be considered to be a mineral. I have not examined the section of the copper.

Q You say refined copper is not a mineral? A. No, sir, it is a metal.

Q It is a metal obtained from a mineral ore containing it, that is right? A. Yes, that is correct.

Q I think perhaps the time has come when we had better bring you down a little closer to our own time. I suppose you know Dr. John A. Allan of the University of Alberta? A. I have only become acquainted personally with Dr. Allan casually in the hall in the last day or two or so.

Q I am showing you under the imprimatur of the King's Printer of Alberta the First Annual Report on The Mineral Resources of Alberta by Dr. John A. Allan.

A Yes, sir.

Q And in Dr. Allan's report I read this:

"The services of Dr. -- "

this is a letter of transmittal by Mr. Stirling, who was the Deputy Minister of Mines to the Provincial Secretary, -

"The services of Dr. John A. Allan of the University of Alberta, were obtained for the purpose of investigating deposits reported to exist in different parts of the province. Dr. Allan was also engaged during a portion

"of the year 1919 in preparing fairly comprehensive reports on the different mineral deposits in the province. These reports which are attached hereto, and will be added to each year as new information comes to hand, refer to the following minerals: "

and in the list of minerals I find natural gas, nickel and petroleum in that order. Now, there can not be any doubt but what that language means, can there? A. As far as the excerpt is concerned, yes, sir.

Q There can not be any doubt at all? A. The author used those words.

Q Yes, very well. Well then, I go on to the next page and I read to you from Dr. Allan's letter of transmittal from the University of Alberta, dated March 1st, 1920, and he writes:

"I have the honour to submit, herewith, a report on the Mineral Resources of Alberta. This report is made up of separate bulletins on eighteen different minerals which are known to occur in Alberta."

No ambiguity there, is there? A. No. I mean, I have not seen what this refers to.

Q I see. A. We have just had an illustration of where one has to look at the section to determine what the word meant, how the author used it.

Q Then in his introduction Dr. Allan goes on:

"The details given in this report on each of the minerals consist essentially of a compilation of all available information which has been abstracted from numerous reports and publications of the Geological Survey and the Mines Branch of Canada, and from various scientific journals."

Dr. Allan was there referring to the type of report that you and I have been looking at in these early years, was he not? A. I expect so.

Q Yes. Now, I would just like you to look at that, Dr. Fancher, and he starts here with the bitumen. Perhaps before I refer you to that, I want you to look at the back page where there are 18 different substances listed. Now, Dr. Allan has referred to 18 different minerals, is that right? A. Well, sir, it does not say that. It says on the Table of Contents that these are the subjects.

Q I see. A. Those are the subjects.

Q Will you count those then and tell me whether there are 18 substances mentioned on that back page?
MR. HELMAN: My lord, that is a year book. It does not follow that Dr. Allan ever prepared that index.
Q MR. STEER: There are 18, are there?
A There are eighteen words there, yes, sir.
Q I see. A. There are eighteen titles.
Q Now, will you start there and go through those headings from bitumen on through and count the headings and tell me how many headings there are? A. Through this whole bulletin?
Q Yes. Perhaps as you go along you will read the name, the headings of each section, and you start with bitumen. A. The one you have indicated is the first here, that is, bitumen. That is the heading of the section of the report.
Q And the second one is? A. The second heading in bold face type is building stone. The third bold face heading is clay.
Q The next one is coal on page 46, Doctor? A. Thank you, I had skipped over it.
Q It has coal on page 46, that is right? A. On page 46 I find coal.
Q And page 50, copper? A. Copper and gold.
Q At page 53, gold? A. Yes, sir.
Q And also page 53, gypsum? A. Yes, sir.
Q At page 58, iron? A. Yes, sir.
Q At page 69, lead? A. Yes, sir.
Q And page 69, mineral springs, the same one as lead?
A Yes, mineral springs.
Q At page 77, natural gas? A. Yes, sir.
Q And page 79, nickel? A. Yes, sir.
Q At page 80, petroleum? A. Yes, sir.
Q And page 82, phosphate? A. Yes, sir.
Q At page 84, potash? A. Yes, sir.
Q At page 87, salt? A. Yes, sir.
Q At page 103, talc? A. Yes, sir.
Q And page 103, zinc? A. Yes, sir.
Q And those are separate sections with regard to those various minerals, is that right? A. Yes, sir. I notice the section on clay includes shale.
Q And the author of that report, to come right down to cases, the author of that report regarded petroleum and natural gas as two separate minerals, did he not? A. He gave them two separate headings. I do not know what he regarded.

I mean, I see shales under clay.
Q Well, this is what Dr. Allan said in transmitting his report, he said:
"This report is made up of separate bulletins on eighteen different minerals which are known to occur in Alberta."
And I ask you whether in listing those 18 different minerals Dr. Allan regarded petroleum and natural gas as two different minerals? A. He used 18 headings, and he says -
Q You say you see better than you hear, and perhaps if I ask you to look at this passage I can get a candid answer from you. Will you look at those words?
A "....separate bulletins on eighteen different minerals,"
and I have checked these.
Q Wait a minute. A. Excuse me.
Q Separate bulletins on eighteen different minerals, and you read us the headings of those eighteeen different bulletins, didn't you? A. Yes, sir.
Q And included in the eighteen is one bulletin on natural gas and one bulletin on petroleum, is that right? A. Yes, sir. And in the one bulletin on clay is included shale and clay.
Q I see. So that he should have had nineteen, should he? A. I do not know. I do not know what the problem was.
Q Well, the problem is a report on the minerals that are known to occur in Alberta in 1919, and this is a report given in 1920 on that subject; that is the problem, Dr. Fancher. Now, I ask you again, Dr. Fancher, did Dr. Allan regard petroleum and natural gas as two different minerals? A. He certainly put them in separate portions of that book.
Q And did he describe them as separate minerals?
A I have not read it, sir.
Q Pardon? A. I have not read it, sir.
Q Well, I will let you read it again. A. You mean, the description of petroleum and gas?
Q No, I am not talking about the description of petroleum and gas at all.
MR. HELMAN: I think the witness is entitled to look at the book.
MR. STEER: Why, certainly, he is entitled to look at the book.
Q Now, this is what I refer to (indicating).

MR. HELMAN: My friend is reading from the transmittal letter. I want to make this clear on the record, he is not actually reading what is said in the different reports.

A Mr. Steer, I will agree that Dr. Allan in his letter of transmittal says that this report is made up of separate bulletins on 18 different minerals, and also I see in checking this the coincidence between his statement that there are 18 bulletins here and the 18 section headings here.

Q MR. STEER: Yes?

A But I do not know how many minerals are referred to in this report.

Q Perhaps I will just make this last effort, Dr. Fancher. I am now looking at Mr. Stirling's letter when he is sending the report to the Provincial Secretary.

MR. HELMAN: This is a letter from somebody else entirely; it is not Dr. Allan, it is Mr. Stirling.

Q MR. STEER: Does he refer to the same 18 substances? A. Mr. John T. Stirling in his letter of transmittal dated February 17th, 1920, does state:

> "These reports which are attached hereto, and will be added to each year as new information comes to hand, refer to the following minerals - "

Q Wait a minute. "To the following minerals"? A. Yes.

Q Just one moment. The report has to do with the list of minerals that he lists in that letter, is that right? A. Yes, sir, that is what he says.

Q Yes. Now, in the list which Mr. Stirling gives, petroleum and natural gas are included, with nickel intervening between them, just look at it? A. Yes.

Q Is that right? A. Yes.

Q And there are separate headings on all those 18 substances in the main body of Dr. Allan's report?

A There are portions of this report with the headings.

Q The same as those 18? A. Yes, the same as those 18. I expect they are, Mr. Steer.

Q Well, you read them out to us? A. Yes. I did not check them.

MR. STEER: As a matter of convenience, my lord, I would like to file this report.

THE COURT: Any objection?

MR. NOLAN: No, my lord.

MR. HELMAN: I have no objection to it. I would just like to see it.

THE COURT: Exhibit 134.

FIRST ANNUAL REPORT ON THE MINERAL RESOURCES OF ALBERTA BY DR. JOHN A. ALLAN PUT IN AND MARKED EXHIBIT No. 134.

THE COURT: I think we will stop now. It is just 12:30, and a number of those who are here and taking part desire to attend the funeral this afternoon, so that we will adjourn until 3:30. I would like, so think this over, we must get through by midnight tomorrow night, and I think we had better sit this afternoon. We will lose most of the afternoon, unfortunately, but we will get back to work at 3:30 and probably sit until 6:30, and then I am suggesting that you gentlemen might discuss it among yourselves whether you would be ready to start again at 8:00 o'clock. In any event, we will start this afternoon at 3:30. Court stands adjourned until 3:30.

: : : : : : : :

AFTERNOON SESSION,
November 24th, 1951.

GEORGE HOMER FANCHER, recalled, already sworn, cross-examined by Mr. Steer, testified as follows:

Q MR. STEER: I would like now to refer you, Dr. Fancher, to this Geology of Canada, 1863, the publication of the Geological Survey of Canada, and on page 6 in Roman numerals you will see this stated:

> "The labours of my colleague, Mr. T. Sterry Hunt, comprehend all that has been done in connection with the survey in the chemical analyses of mineral species and mineral waters, of rocks, and of minerals capable of useful application. His researches have also been devoted to the study of rock metamorphism. The principal results of his investigations are given in his own words in the four chapters....."

and this is in Roman numerals -

> "XVII to XX; while many of them are interwoven with the matter of other parts of the volume, particularly that of Chapter XXI where the theory of metamorphism is also considered."

A Yes, sir.

Q So that you see from that that Sterry Hunt was the author of Chapters XVII to XX? A. Yes, sir.

Q Now, I am going to refer you to page 521 of this work, which is, you will see - - A. 521?

Q 521, Chapter XVI begins at page 444, you see?

A Yes, sir.

Q And this is Chapter XVII? A. Yes, sir.

Q And page 521 is in this chapter, there can be no doubt about that, I take it? A. Yes, sir.

Q Now, I would like to read to you what is said. He says:

> "Under the head of carbonaceous minerals may be mentioned the various forms of liquid and solid bitumens, carburetted hydrogen gas, bituminous shales, coal and graphite."

and he goes on to say:

> "portions of hydrocarbonaceous matters, probably derived from organic remains, are found

"from the base of the Palaeozoic rocks in Canada, and in many cases assume the form of bitumen. The presence of a bituminous matter is evident in many of the limestones and dolomites of the Quebec group, from the odour which these rocks evolve when heated, struck or dissolved in acids. Its presence is still more strongly marked in the limestones of the Trenton group, and indeed in most of the palaeozoic limestones of Canada. In many places it appears in the form of petroleum or mineral oil."

Now, I would like you to tell me whether two observations are not possible on that passage. One is that Mr. Sterry Hunt identified petroleum and mineral oil? The last bit I read is right in here (indicating). A. Yes, sir, he mentions petroleum and minerals oils here.

Q He identifies them, and he says that they are synonymous, doesn't he? A. Yes, sir, he said "petroleum or mineral oil".

Q Yes, he does. And then up above here, he is giving a list of mineral substances. He separates liquid bitumen or petroleum from natural gas, doesn't he?

A He mentions them separately, yes.

Q Now, you will take it that this is the 1894 Geologic Survey Report (indicating)? A. Yes, sir.

Q And I would like to read passages, which are the longest, I might say, that I am going to read, my lord, but it will take a little time to read those. You do not know anything about the boring by the Dominion Government up at Athasbasca Landing in these early days, 1894? A. No, sir, I do not.

Q Well, I am going to read you a bit about it.

"The occurrence - - "

I am reading at page 6-A -

"The occurrence of great quantities of bitumen or maltha along a portion of the Athabasca River has long been known, having been noticed and commented upon by the very earliest travellers in the region. Beds of sand or very soft sandstone of Cretaceous age, varying from 140 to 225 feet in thickness, are thene found to be more or less completely saturated with bitumen, for a distance of some 90 miles along the river. These beds are known as 'tar sands'. More recently a number

"of smaller occurrences of bitumen in the form of 'tar springs', as well as sources of combustible gas, have been found at different places over a very extensive district."

And then I skip a paragraph.

" In 1890, Mr. R.G. McConnell, of this Survey, made a careful examination of the geological conditions along the Athabasca and Peace Rivers and in the intervening country, with special reference to the presumed existence of an oil field. He ascertained, with as much accuracy as possible from the natural outcrops, the thickness and the lie of the shales and sandstones of the Cretaceous system by which the greater part of the region is covered. In his report he writes."

Now, I will skip the report. And then the author goes on:

"The importance of actually ascertaining by means of boring operations the existence or otherwise of economically valuable bodies of petroleum in the Athabasca region has been recognized for many years, but the remoteness of the region and the apparent impossibility of immediately utilizing any discoveries which might be made, have hitherto prevented the necessary experiments."

And then he says that the recent completion of the railway has changed that. Then he goes on to say:

"After careful consideration, it was determined - "

after a vote of $7,000.00 from the Canadian Government had been made -

".....that a bore hole should in the first instance be sunk at Athabasca Landing, at which place the depth of strata to be passed through in order to reach the horizon of the 'tar sands' had, as above stated, been estimated by Mr. McConnell at approximately from 1200 to 1500 feet.

Then I skip a bit.

" On October 24th, the bore hole had reached a depth of 1011 feet, when it was found necessary, owing to the incoherent character of the rocks, to stop work pending the arrival of more casing. This it is proposed to place

"in the hole during the winter, but the drilling itself can scarcely be resumed till the spring, as the great quantity of gas met with, renders it dangerous to keep a fire in the derrick-shed or anywhere in the vicinity of the well.

The following account of the work is summarized or extracted from Mr. Frazer's report, received on December 19th.

And then I skip the report except to say this, at the bottom of page 9-A, "at 245 feet", and I am quoting:

"a hard streak, similar to the preceding ones, was struck, and on drilling into it a strong flow of gas was met with. This flow thre the water that was in the bore hole over the top of the derrick. There was no oil with this flow of gas, but it made the drilling more difficult, as it cut down the shale and caused it to cave in badly. We, therefore, drilled another 15 feet and put the casing down at 260 feet."

And then he says that:

"at 267 feet more gas was struck,"

and the gas was reported to be of very strong flow. And then I pass on to page 13-A. You are having no difficulty following this? A. No, sir, I understand what you are reading.

Q "It appears to be most important that the investigation of the petroleum fields of Athabasca and Northern Alberta, thus begun during the past summer, should be continued until the main features at least of the character and value of these fields shall have been determined. The boring at Athabasca Landing has not yet attained the minimum depth at which the occurrence of petroleum at that place is considered probable; but should petroleum not be encountered in considerable quantity at a less depth, and should no unforeseen accident occur in connection with the work, I would advise that this boring be carried down to a depth of at least 1500 feet. In any case, the information obtained thus will be of great value in determining the position and useful depth for further sinkings. In the event of the discovery of petroleum at Athabasca

"Landing, the machinery should be moved to another carefully selected locality further to the south and nearer to railway communication. In the opposite event, the continuation of the investigation is no less necessary, for its abandonment at this stage would tend only to discourage further enterprise, while the probability of an ultimate success would in reality be not materially lessened. It would then, however, be advisable to select a place for the second boring further down the Athabasca River, nearer to the actual outcrop of the bitumen-bearing sands and where the depth of the overlying rocks is less, although the distance from existing means of communication is greater.

All indications favour a belief in the existence of a great petroleum bearing region in the Northwest, and the results which would flow directly from the definition of such a region, are so important as to warrant any expenditure which may be necessary in that direction. It is not probable that petroleum, if found in Northern Alberta or in Athabasca, would seriously compete in the east with the already established petroleum industry of Ontario; but the considerable and yearly increasing demands of British Columbia and the Northwest Territories would afford a local market which might be large, as, if the oil could be furnished at a low price, it would undoubtedly be employed as a liquid fuel for railways in many parts of the country. The comparative proximity of the Athabasca region to the Pacific, further indicates that an enormous foreign demand, co-extensive with the shores of that ocean, might be most profitably supplied from this region. The extent of this market may be in part realized when it is stated that the export of illuminating and paraffin oils from the United States to Japan, China and Hong Kong alone, amounted in 1893 to 67,572,136 gallons."

The author makes a clear distinction, Dr. Fancher, between natural gas which had been discovered in the

region in large quantities, and petroleum which they were seeking, does he not? A. No, sir, he does not.

Q I see. Well, I would like you, perhaps, to tell me why you say that. A. The article to me from hearing excerpts of it at length, and not knowing the interconnections, nevertheless I think it is very clearly expressed, and I think the author has used the word rather judiciously and well.

Q And you think the author of this article has used the word "petroleum" as inclusive of natural gas, do you? A. I do not think he ever made any statement to that effect, or to the contrary.

Q Well, let us see, Dr. Fancher.

"All indications favour a belief in the existence of a great petroleum bearing region in the Northwest."

Now, you say that is inclusive of natural gas, do you? A. Excuse me, sir, would you read it again?

Q Yes. I am reading a paragraph that I read you before. A. Yes, sir.

Q "All indications favour a belief in the existence of a great petroleum bearing region in the Northwest."

A Yes, sir.

Q And your idea is that the word "petroleum" includes natural gas? A. It could.

Q Does it? A. In my opinion, it would.

Q In your opinion it does, as used in that paragraph?

A Yes, sir, it could.

Q All right. Will you just read the paragraph to yourself carefully? A. Which page?

Q This last paragraph. That is where the language is I used, is it? A. Yes.

Q Read it carefully to yourself. A. No, sir, I do not find anything in this that to me would preclude the inclusion of natural gas in petroleum.

Q I see. Notwithstanding the fact that the paragraph talks about a competition between the petroleum of the Northwest Territories and Eastern Canada?

A The author states that the general belief is that a great petroleum bearing region exists in the Northwest.

Q I wonder if you would go through that paragraph, Dr. Fancher, and tell me whether the word "oil" is used in it? A. Yes. The oil there

refers undoubtedly to a commodity of commerce which could be used for fuel.

Q Is the word "oil" used? A. Yes, sir.

Q Read the passage, please.

A "It is not probable that petroleum, if found in Northern Alberta or in Athabasca, would seriously compete in the east with the already established petroleum industry of Ontario."

That is a clear thought.

Q That is a clear thought? A. Yes, sir.

Q I see.

A ".....but the considerable and yearly increasing demands of British Columbia and the Northwest Territories would afford a local market which might be large, as, if the oil could be furnished at a low price, it would undoubtedly be employed as a liquid fuel for railways in many parts of the country."

Liquid fuel and oil are synonymous, you might say there, and I would say they are commodities for the market.

Q Would you say that in that paragraph the words "petroleum" and "oil" are synonymous? A. Not necessarily, no, sir.

Q Are they? A. No, sir.

Q No, they are not. A. No, sir, not necessarily. They can be.

Q I see. Well, I am going to put it to you, Dr. Fancher, that the word "petroleum" throughout this paragraph is used in the sense of oil and can not be used in any other way, and I would like you to think about it?

"All indications favour a belief in the existence of a great petroleum bearing region in the Northwest."

Now, there is nothing conclusive about that?

A No, sir.

Q I concede that.

"and the results which would flow directly from the definition of such a region, are so important, as to warrant any expenditure which may be necessary in that direction. It is not probable that petroleum, if found in Northern Alberta, or in Athabasca, would seriously compete in the east with the already established petroleum industry of Ontario."

Does it mean "oil" there, or does it mean "natural gas" or does it mean both? A. It would mean all products of petroleum, the petroleum industry.

Q And does it mean natural gas? A. It could include that.

Q Does it? A. I do not know, sir.

Q I see. All right, if you do not know. A. It depends on what is found in Athabasca.

Q Well, there is a lot of natural gas that has been found in Athabasca, which is 3,000 miles from Ontario. Does it mean natural gas?

MR. HELMAN: Is my friend giving evidence saying a lot of natural gas was found 3,000 miles from Ontario?

MR. STEER: I am not giving evidence because, as far as that goes, I take it that the court will take judicial notice of that distance.

MR. HELMAN: I object to the form of the questions.

Q MR. STEER: We have seen in the earlier part of this passage, Dr. Fancher, that there are tremendous amounts of gas discovered in these borings, do you recall that? A. Yes, it says gas discovered.

Q Then I will read you this sentence again,

> "It is not probable that petroleum, if found in Northern Alberta or in Athabasca, would seriously compete in the east with the already established petroleum industry in Ontario,"

and I am suggesting to you that that must mean oil?

A Well, sir, it means commercial deposits of petroleum.

Q And includes natural gas, in your opinion? A. It could.

Q Does it? A. Yes, sir.

Q I asked for your opinion? A. Yes, sir.

Q I see.

> "but the considerable and yearly increasing demands of British Columbia and the North-west Territories would afford a local market which might be large, as, if the oil could be furnished at a low price, it would undoubtedly be employed as a liquid fuel for railways in many parts of the country."

Does that liquid fuel for railways that he is talking about there include natural gas? A. No, sir.

> "The comparative proximity of the Athabasca region to the Pacific, further indicates that an enormous foreign demand, co-extensive with the shores of that ocean, might be most

"profitably supplied from this region." Demands for what, oil or natural gas? A. That demand certainly would be for liquid forms of petroleum.

Q Anything known about L.P.G. in those days? A. I do not think the term had come into use.

Q Anything known about buying propane, butanes and pentanes in 1894, would you say? A. Do you mean as commodities of commerce?

Q Yes, sir. A. No, sir.

Q So that the extent of this market may be in part realized? That is all around the Pacific, isn't it?

A Yes.

Q "When it is stated that the export of illuminating and paraffin oils from the United States to Japan, China and Hong Kong alone, amounted in 1893 to 67,572,136 gallons." We are talking about oil, aren't we? A. We are talking about liquid petroleum products, yes, sir.

Q And then I would like to refer you to our mineral statistics again, Dr. Fancher, in this volume, and I call your attention to the fact -

MR. HELMAN: What volume is this, Mr. Steer?

MR. STEER: I beg your pardon?

MR. HELMAN: What volume is this?

MR. STEER: The 1894 volume which I have been already discussing with the witness.

MR. HELMAN: It is the same one that you were just looking at?

MR. STEER: The same one, yes.

Q On page 89-S under the heading "Mineral Statistics and Mining", which is the section of these reports that we were looking at this morning? A. Yes, sir.

Q We have got a section on natural gas? A. Yes, sir.

Q And then we have a section on nickel? A. Yes, sir.

Q And then we have got a section on petroleum? A. Yes, sir.

THE COURT: Mr. Steer, I am not going to stop you, I have not stopped anybody yet.

MR. STEER: Yes, my lord?

THE COURT: I am simply going to direct the Statement of Claim to your attention and to all counsel. We have had a tremendous amount of evidence as to how petroleum exists under the ground and the manner in which rocks lie. I do not know where. But I have strong notions that the indications are

that is the way they lie everywhere, and in determining the two questions, the one question that is before me, I have not any doubt that it is very valuable, but I have only two questions to settle and they are set out in the Statement of Claim. And while it probably will be necessary for me to take into consideration all that has been said, at the present moment I am of the opinion that all these references, not necessarily those that you are dealing with at the present time, but all of them, whether they refer to Ontario or Texas or anywhere else but Alberta, are of very little value. Now, I think if counsel will look at the prayer, and this is presumed to be a lawsuit, if you look at the prayer, that is all I have to deal with, is the prayer in the Statement of Claim.

MR. STEER: Yes, my lord.

THE COURT: Now, if that makes any difference to you, perhaps you could shorten your cross-examination.

MR. STEER: Quite so, my lord.

THE COURT: If it does not make any difference to you, go right ahead.

MR. STEER: I will be only a very few minutes, I can assure your lordship, and I am satisfied my learned friend, Mr. Riley, won't be long.

THE COURT: All right.

MR. STEER: But there are one or two other references along this line, and I suggest, my lord, of course, I suggest that this Canadian Geological Survey, and some of the passages that I have been reading particularly, have to do directly with this country.

THE COURT: Yes, that is quite possible.

MR. STEER: I have got here the mineral statistics and mines report in the Geological Survey volume for 1892 and '93.

Q Dr. Fancher, I take it that you will agree that this report is made up in the same way as the others that I have been showing you? A. Yes, sir, I will take your statement.

Q And then I have a summary report of 1905, and I would like to refer you for a moment to just one passage here. This is the Geological Survey, too. And I call your attention to page 7, and will you read the heading? A. Yes, sir. "Minerals Most Enquired For".

Q And in that list of minerals that are most enquired for, according to this report, in Canada are included both natural gas and petroleum? A. Yes. As I have pointed out this morning in the specific examples, the word "minerals" may be used in an accurate sense or a general sense. Strictly speaking, a mineral is a single chemical compound or element.

Q Are you suggesting that the Geological Survey of Canada, when it uses copper, is referring to pure metallic copper and not referring to the occurrence of copper ores? A. Not at all, sir. I just said that the word "mineral", like a number of other terms, enjoys both a narrow usage, a specific and accurate usage, and also a wide usage, or broad.

Q I see. I think I will show you just one other book. Here is a volume entitled "Alberta Facts and Figures" published by the King's Printer and compiled and published by the Bureau of Statistics of Alberta. And I call your attention to the table of contents?

A Yes, sir.

Q And the date of this publication is 1950, and I call your attention to the table of contents, and the list of minerals, is that right? A. Yes, sir.

Q And are petroleum and natural gas contained in the list of minerals as separate substances, so far as the list goes? A. Yes, sir, they are listed separately.

Q Yes? A. It is an example of wide usage, the broad meaning of minerals.

Q And then when you go over to 153 we have got a section of the book on petroleum, haven't we? A. Yes.

Q And then when you go over to page 164 we have a section on natural gas? A. Yes, sir.

Q And on page 265 you have a section of petroleum products? A. Yes, sir.

MR. STEER: We were going to ask, my lord, that we might have leave to photostat those passages which in our submission might be of value and hand them in.

THE COURT: I see no objection.

MR. STEER: Very good, my lord. Would your lordship give us a number?

THE COURT: Do you just want one number?

MR. STEER: Yes, one number, my lord.

THE COURT: 135.

PHOTOSTATIC COPIES IN QUESTION MARKED EXHIBIT 135.

CROSS-EXAMINATION BY MR. RILEY.

Q Sir, as I read your brief you were dealing with the liquid and gaseous forms of petroleum, is that correct? A. Yes, sir.
Q Is there a solid form of petroleum? A. What?
Q Is there a solid form of petroleum? A. Yes, sir.
Q Have we a name for it? A. There are some forms, I believe, I have mentioned in the report, ozocerite.
Q What about asphalt? A. Well, asphalt is difficult to classify either as a solid or otherwise.
Q It is a member of the petroleum series, isn't it, sir? A. Yes, sir, it is. It is generally considered to be of the plastic or semi-plastic series.
Q Well, is asphalt a solid petroleum, I will ask you the direct question? A. I do not think so.
Q Not in your opinion? A. No, sir.
Q All right. Now, sir, throughout several of the briefs here, the phrase has been used, "petroleum gas" and sometimes "petroleum natural gas". The ordinary, every-day name for what is referred in those briefs under those two names is "natural gas" is it not, sir? A. Do you mean in the trade?
Q Yes, anywhere? A. Yes, the commodity of commerce certainly is natural gas.
Q Well now, listen, let us not talk about commodities of commerce. Here is a book published by the State of California, Department of Natural Resources, Division of Mines, for the year, for March 1943. You have seen these publications often, have you not? A. Yes, sir.
Q And this is a publication in which there are 126 leading authors that have contributed to the bulletins, is that correct, sir? A. I will take your word for it.
Q Well, let us take the book's word for it.
A All right.
Q This is a publication that can be relied on, isn't it? A. Yes, sir.
Q Let us turn over the page and look at the several matters discussed, just follow them down with me, and will you read them into the record instead of me? A. What do you want me to read?
Q Just read those there. A. Natural gas?
Q Yes.

MR. HELMAN: I rise to enquire as to the division that has been made of the cross-examination. I understood that Mr. Steer was taking one part of the cross-examination and that my learned friend, Mr. Riley, was taking an unrelated part, and I acquiesced in that, but at the present time they are both covering the same ground, and I can not see the distinction. They are both asking him to read passages of definitions, and they are both covering the same ground. My lord, it is the most extraordinary procedure for two counsel to cover the same ground. I thought I was making a considerable concession in permitting two counsel to cover different things.

THE COURT: I think that Mr. Steer said that the cross-examination naturally fell into two different headings, under two headings, that he would take one and Mr. Riley the other, and I think that you agreed that that should be done.

MR. HELMAN: Yes, my lord.

THE COURT: And I do not think there is anything said, I do not think there was anything said by anybody as to how those divisions came about, but I do say that the rule is that two counsel should not cross-examine on the same matter.

MR. RILEY: Well, my lord -

MR. HELMAN: That is the only point I did acquiesce - that is the only point, my lord. I did acquiesce, and I do not want to in the slightest way withdraw my acquiescence with regard to the two counsel having separate portions of this subject matter, taking separate portions of the subject matter. One or the other of them might be more learned on some of those points, I thought, and wanted to question the witness about it, but I do object to them covering the same ground.

MR. RILEY: Now, my lord, I shall be very, very brief, but my position is that I am not covering the same ground my learned friend, Mr. Steer, dealt with. Mr. Steer dealt with the Canadian literature.

THE COURT: That clock is going around, and I do not like to see it going so fast.

MR. RILEY: All right, sir.

THE COURT: I do not like to see it going so fast and the lawyers going so slowly.

MR. RILEY: I will just take a minute, my lord.

THE COURT: Yes.

Q MR. RILEY: The first one was natural gas, and there are a number of publications under it?

A. Yes.

Q The next one is "Natural Gas,Accumulations (see also Natural Gas, origin)", and several articles under it?

A. Yes.

Q And the next one is "Natural Gas, Geology"?

A Yes, sir.

Q And there are several publications under that?

A Yes.

Q The next one, "Natural Gas, Legal Aspects"? A.Yes.

Q The next one, "Natural Gas, Migration"? A. Yes.

Q The next, "Natural Gas, Occurrence with Quicksilver"?

A Yes, sir.

Q The next, "Natural Gas, Origin (see also Natural Gas, Accumulation("?

A. Yes, sir.

Q The next, "Natural Gas, Production"? A. Yes, sir.

Q Next, "Natural Gas, Reserves"? A. Yes, sir.

Q Next, "Natural Gas, Sales"? A. Yes, sir.

Q And the next one, the last one, is the only one which deals with it as an article of commerce?

A I did not mean to imply that that was the sole meaning, sir.

Q Do you see anything about petroleum gases there, or petroleum natural gas, or anything there with regard to that language?

A. No, sir. It is not in this publication.

Q No. Now, sir, I wonder if you would give me the chemical dictionaries used by you. There are none referred to in the brief. I understood you have had considerable experience as a Professor of Chemistry?

A No, sir.

Q Chemical Engineering?

A. No, sir.

Q Well now, may I ask about your qualifications, sir? I understood you were here in two aspects, one was petroleum engineering and one was as a chemical engineer.

A. I am trained as a chemical engineer.

Q Yes?

A. I have had, while I was an undergraduate student, experience in teaching chemical engineering, and my work always dealt solely with laboratory work in that respect.

Q You are familiar with this publication, "The Condensed Chemical Dictionary", are you not, sir? That happens to be the 1937 edition, but it is a recognized American work?

A. Yes, sir.

Q You are quite familiar with it?

A. Yes.

Q And it enjoys a good reputation? A. Excellent.
Q Excellent? A. Yes.
Q I show you now the definition of petroleum. We are now looking at page 353, are we not? A. Yes, sir.
Q "Petroleum (earth oil, lima oil, naphtha, crude oil). Colour and properties: A thick, heavy, inflammable liquid, varying in colour from yellow to dark reddish-brown or black according to its place of origin. It has a peculiar distinct heavy odor also varying with its place of origin and composition. It usually shows a distinct greenish fluorescence. Constants: Specific gravity 0.780 to 0.970."
Is that correct? A. That is what it says, yes, sir.
Q Well, I just wanted to make sure that I am not misquoting the dictionary. A. You are reading correctly, yes, sir.
Q "Derivation: All petroleums are mixtures of hydrocarbons, as many as one hundred and fifty different hydrocarbons having been found in the different crude oils. The important constituents are benzine, gasoline, kerosene, (solar oil), paraffin, petrolatum (vaseline), petroleum ether, ligroin, petrolene, heavy lubricating oils, etc."
No natural gas there, is there? A. No, sir.
Q "Crude petroleum is separated into its constituents by fractional distillation with subsequent chemical purification of the individual fractions, followed by redistillation."
And then it goes on:
"Containers: Tank cars; barrels."
A Yes, sir.
Q Now, let us see what he has to say about natural gas.
"Natural gas - "
and we are now looking at page 323 -
".....a mixture of gaseous hydrocarbons, having a high calorific value, formed in the earth and usually accompanying petroleum, though sometimes found alone, and frequently confined under great pressure. The composition varies with the locality from which recovered."
Now, I pause there for a moment. If that definition be correct, that is exactly what we have here, we have gas, natural gas, found alone; we have natural

gas found accompanying petroleum, and we have it found under great pressure in its present form in this present case, have we not, sir? A. You have those conditions here, yes, sir.

Q And the dictionary goes on:

"The composition varies with the locality from which recovered. When it does not contain an appreciable amount of readily condensible gasoline it is known as dry natural gas. Wet natural gas contains readily condensible gasoline. The total mileage of the country's natural gas pipe line - "

and the "country" means the United States, does it not? A. I would think that to be right, yes, sir.

Q "The total mileage of the country's natural gas pipe line system is not so high as is commonly supposed, amounting to about 40,000 miles for the trunk lines and perhaps an equal amount for gathering lines. This mileage is spread over twenty-five states. The greatest concentration of natural gas pipe lines occurs in Ohio,"

and so on. Then he goes on and gives where it is produced in commercial quantities, the total production during the year 1928, the most important gas fields, and the statistics and the analyses. I note in this book that you and I are looking at, this Chemical Dictionary, that there are acknowledgments to numerous persons who co-operated in supplying data from which the dictionaries were taken, from which the meanings were taken? A. Yes, sir.

Q Now, sir, I told you that it was the year 1937, apparently it was published in the year 1937?

A I thought it said that, yes, sir.

Q Now, I show you another publication headed: "Dictionary of Geological Terms" by Mr. C.M. Rice, published in 1948. It is an American work. Do you recognize the author at all? A. No, sir.

Q You know nothing about him? A. No, sir.

Q Apparently he is from - while the work is not too complete, the wording is not too complete, he is from Princeton University? A. He lives in Princeton, yes, sir.

Q And in the foreword we find that he gives his grateful thanks to members of the Department of

Geology of Princeton University for their help, and with regard to the sources of material.

MR. HELMAN: I have not objected to my learned friend with regard to these, but the procedure with regard to the use of textbooks has been laid down in our court where if the witness recognizes the book as an authoritative book he can be asked something about it with regard to something in it. This witness has said that he does not know this book, and, surely, my friend can not go on and read something to the witness that he does not know about. He has got to put his own witness in.

THE COURT: Well, I have allowed every book of reference from the North Pole to the South Pole to go in.

MR. HELMAN: So far as I was concerned, my lord, I do not remember any book that went in unless the witness agreed that it was authoritative and that it was something that was recognized by the witness.

THE COURT: I have heard a witness here, for whom I have a very high regard, asked what was meant by authoritative.

MR. RILEY: I just want to read the definition of petroleum and ask him what he has got to say about it from this 1948 book.

THE COURT: I do not know how many definitions we have had, but is it anything like the one hundred and one we have already had?

MR. RILEY: It does not vary one bit from the types of definitions our side has been submitting to you.

THE COURT: Why bother this witness then, Mr. Riley?

MR. RILEY: All right.

THE COURT: But, look, Mr. Riley, don't you quit just because there has been an objection, or because I think you have enough definitions in already. If you want to put it in, put it in.

MR. RILEY: No, I won't bother, sir.

Q Now, sir, in looking through your Exhibit 122 - I almost was going to say brief - I find these words:

"Oil", "crude oil", "petroleum" and "crude petroleum",

and I want to get your interpretation of each of the meanings of those words I have heard you use,

or that you have used, and I put it to you this way: Suppose I made a lease to you of all the oil within, upon or under a certain quarter section in 1906, did that carry with it the natural gas on your interpretation of oil? A. Well, is that a legal opinion, or am I just asked to give my opinion?

Q I am asking for your interpretation of words you have used? A. And the question is?

MR. HELMAN: I object to the question as being a question of law that my friend is asking. Surely we have some limits to what is to be asked of a witness.

THE COURT: Mr. Riley, surely that question is answered in the report?

MR. RILEY: Sir, my lord, he has used the word "oil", he has used the words "crude oil", he has used the word "petroleum", and he has used the words "crude petroleum", and all of these are words with a different shade of meaning. Now, for example, this witness has said at page 5 of Exhibit 122,

> "The term 'crude petroleum' is considered to be broader and more inclusive than 'crude oil'."

That is what he says, that is his statement, and I am certainly at liberty to find out and enquire what these words mean to him. He gives no reason for that statement, but he makes this statement,

> "The term 'crude petroleum' is considered to be broader and more inclusive than 'crude oil'."

And he has used these four different words or phrases with different shades of meaning, and I am trying to find out what, to him, each of the words mean.

THE COURT: All right, go ahead.

MR. HELMAN: That is not what he asked him. What was the page that was on?

MR. RILEY: Page 5. I wonder if the reporter would read the question back now.

A I understood your question. It was as to what each of these meant.

MR. RILEY: No, I want to find out with regard to each of those. Will you read back the question I asked, Mr. Howard?

BY THE REPORTER (Reading):

> "Q. Now, sir, in looking through your Exhibit 122 - I almost was going to say brief - I find these words: 'oil', 'crude oil',

" 'petroleum' and 'crude petroleum', and I want to get your interpretation of each of the meanings of those words I have heard you use, or that you have used, and I put it to you this way: Suppose I made a lease to you of all the oil within, upon, or under a certain quarter section in 1906, did that carry with it the natural gas on your interpretation of oil? "

THE COURT: What was that last?

MR. RILEY:
"on your interpretation of oil?"

THE COURT: Yes.

MR. HELMAN: When he puts it to a witness what it means in a lease, my lord, that is not what he said here. He is dealing with petroleum, natural gas and crude oil. If my learned friend wants to ask him the differences there are in that, that is a simple question, and I have no objection to it, but to ask him what it means in a lease made in 1906, surely that is not a proper question.

THE COURT: I think you had better ask him what it means.

MR. RILEY: What does the word "oil" mean?

THE COURT: Does it make any difference whether in a lease or in a book?

MR. RILEY: Well, I think that he is going to give me a definition that does make a difference, but we will see.

Q What does the word "oil" mean when used in your brief? A. It means the liquid phase of petroleum.

Q Refined or unrefined? A. One would have to look at the way it is used in a particular paragraph or sentence to determine that. It could be used correctly to refer to the liquid phases of petroleum in the reservoir, above the ground, and to those liquid products prepared from petroleum.

Q What does the term "crude oil" mean as used in your brief? A. "Crude oil" is the liquid phase of petroleum, and the word "crude" is used to indicate that it has not passed through any refining processes.

Q Well, are you saying to me that there may be occasions on which the word "oil" and the words "crude oil" are synonymous? A. They can be if they are so used in relation to the thought

in a sentence or a paragraph.

Q What does the word "petroleum" mean? A. The word "petroleum", I believe I defined that. Do you mean the one given here?

Q I just want you to tell me what you mean? A. The word "petroleum" is a naturally occurring - excuse me, sir. "Petroleum" is a naturally occurring mixture of hydrocarbons in wide variety. I would like to modify it. "Crude petroleum" is a natural mixture, a naturally occurring mixture of - I am trying to get it. That is all.

Q You are trying to make a distinction between that and oil, aren't you? That is what you are trying to do, that is very clear, is it? A. No, sir.

Q And that is very difficult, is it? A. No, sir, it is not very difficult.

MR. HELMAN: Let him just answer the question.

Q MR. RILEY: I was not helping him to stammer, Mr. Helman.

MR. HELMAN: Will you finish the question, Dr. Fancher. Let him finish the question. If he wants a little time to answer it, he is entitled to it without my friend interrupting him.

A "Petroleum" is a naturally occurring mixture consisting principally of hydrocarbons.

Q MR. RILEY: And "crude petroleum", have you got down to that yet? A."Crude petroleum"?

Q Yes? A. Well, "crude petroleum" is a mixture that has not undergone any refining process.

Q Now, if you were to name me what oil consists of in the same way that you have named to me what petroleum consists of, you would have to say that oil consists of hydrocarbons, wouldn't you, sir? A. Yes, oil consists principally of hydrocarbons.

Q All right.

THE COURT: All right. Next.

MR. HELMAN: I want to ask this witness some questions in re-examination.

THE COURT: All right.

RE-EXAMINATION BY MR. HELMAN.

Q You were pressed a good deal by Mr. Steer with regard to a report made by Dr. Allan in a document that he produced to you? A. Yes.

Q Now, I put another report to you made by Dr. Allan. Are you familiar with this? A. Yes, sir.

MR. STEER: Could we have a look at that, Mr. Helman?

MR. HELMAN: I tender that as an exhibit, my lord.

MR. STEER: My lord, what my learned friend is tendering is a letter dated September, 1950, signed by Dr. Allan, and is, and I have no doubt that perhaps my friend will correct me if I am wrong, that it was a report made by Dr. Allan as to the issues in this case looking to his being called as a witness, and it is in quite a different category, in my respectful submission, from a Governmental report.

THE COURT: Mr. Helman, why try to put that in just because I have been very lenient? I have watched Dr. Allan sitting here in this audience for a week now. Why shouldn't he be called as a witness, if you want him to say something?

MR. HELMAN: The only reason I was putting it to this witness, my lord, was that the other report was put to him with an interpretation on it which is entirely different from this one, and I wanted to demonstrate that the report contained in the 1920 book, and which was produced, was a report to which Dr. Allan had not directed his mind to the specific problem.

THE COURT: Well, call Dr. Allan as a witness.

Q MR. HELMAN: Was there anything brought out in the books produced to you in cross-examination that has altered the opinion that you have expressed in your brief or in direct examination to me?

A No, sir.

THE COURT: Any other question from anybody? Mr. Nolan?

MR. NOLAN: No, thank you, my lord.

THE COURT: All right, next witness.

MR. NOLAN: My lord, I wonder if I might conveniently interrupt at this time to produce what I was directed to produce, and for which number

76 has been reserved, my lord, namely, the Letters Patent and the supplementary Letters Patent. If I could just take one moment I would read the dates of these documents, which would be of assistance to my friends.

THE COURT: It is Exhibit 76, is it?

MR. NOLAN: Yes, my lord.

THE COURT: All right.

MR. NOLAN: I am producing, my lord, a certified true copy of the Letters Patent, dated the 8th day of September 1880; supplementary Letters Patent dated December 13th, 1898; supplementary Letters Patent dated 4th of July, 1907; supplementary Letters Patent dated 11th February 1913; supplementary Letters Patent 31st July 1913; supplementary Letters Patent 10th December 1914; supplementary Letters Patent dated November 15th, 1915; supplementary Letters Patent dated 15th of September, 1919; supplementary Letters Patent dated 15th January 1925; and supplementary Letters Patent dated the 22nd of April, 1929, all of which should be comprised, my lord, in Exhibit 76.

THE COURT: Very well.

MR. NOLAN: They only arrived today by air mail, and that is why I am late in producing them.

THE COURT: All right. Is there anything else, Mr. Nolan?

MR. NOLAN: No, my lord, that is all.

LETTERS PATENT AND SUPPLEMENTARY LETTERS PATENT IMPERIAL OIL LIMITED PUT IN AND MARKED EXHIBIT No. 76.

THE COURT: All right, Mr. Helman.

MR. HELMAN: I will call Mr. Nowers.

EDWARD B. NOWERS, having been first duly sworn, examined by Mr. Helman, testified as follows:

Q Mr. Nowers, you live in Calgary at the present time?
A Yes, sir.
Q What is your occupation? A. Valuator and manager of P. Burns Agencies.
Q And P. Burns Agencies is a company which deals with land? A. Yes, sir, land and estate management, insurance and appraisal work.
Q Will you just tell us what your experience has been in connection with dealing with land in the Province of Alberta? A. Well, before September, 1905, for something over a year, I was engaged at Innisfail in the land business, real estate and agent for the Osler, Hammond Agency, the C. & E. Land Company, mortgages and that sort of thing.
THE COURT: I wonder, Mr. Helman, are you just trying to qualify Mr. Nowers?
MR. HELMAN: Well, I want to give his experience in the various things that he has done, my lord.
THE COURT: Well, if he tells the story of his misspent life we will be here all night. Can counsel not agree that Mr. Nowers - even I know this - that he is a long-experienced real estate man, and I do not want to go on and give evidence for him - but can they not agree and let us get along?
MR. HELMAN: Well, the only thing is, my lord, that I wanted his qualifications to appear, not for your lordship's benefit, because I know you know Mr. Nowers, but in some other court that may want to look at his qualifications and that may not know Mr. Nowers.
THE COURT: Probably the court would accept the word of Mr. Steer, Mr. Nolan and Mr. Riley.
MR. STEER: I am satisfied, my lord, that Mr. Nowers is a real estate man of long experience in this Province.
THE COURT: Is there anything else?
Q MR. HELMAN: And you have handled a lot of farm land? A. Yes.
Q And in addition to that you have been an assessor in valuing lands? A. Yes.
Q And you presently act as an assessor for some of the Municipal Districts? A. Well, not

now, Mr. Helman, but I have in the past years.

Q You have on past occasions? A. Yes.

Q And you have handled a great deal of land? A. Yes, a good deal.

Q Now, I should tell you, Mr. Nowers, that we are concerned in this case with the meaning of the words "all petroleum" as contained in a reservation of the C.P.R. in which the words were used, "all coal, petroleum and valuable stone". Now, will you tell us what the words - perhaps I should state here that the dispute is whether or not the words "petroleum", "all petroleum" as used there, whether these words "all petroleum" - I mean to say, the dispute in the lawsuit is whether these words "all petroleum" include natural gas. Will you tell us what your understanding is as a man who deals with land?

A Yes. I would say that it would include natural gas, and in all the dealings that I have had over the years, that has been so; I mean, there has been no change as far as I am concerned in that connection.

Q And we are dealing there with the words as contained in a title of land? A. That is correct.

Q And when did you first start to hear the words "all petroleum", hear about them, or the word "petroleum"? A. That, of course, Mr. Helman, is difficult to say. I moved into Calgary in the spring of 1909 and from there on handled a good many real estate transactions and heard, of course, in the appraisal work about the word "petroleum", and later was on the advisory committee of the Soldiers' Settlement Board, but I would say possibly 1912, if it can be identified at any particular year.

Q I see. So that it was not until 1912 that you came across the word as, shall I say, a matter of vernacular as it was used? A. Well, looking back over the years, I would say about then. It is very difficult to give an actual point of time as to when a person realizes a certain thing.

Q Now then, your understanding of the word has been, as you have told us, with regard to its place in a title of land? A. That is correct.

Q Will you just answer my learned friend?

CROSS-EXAMINATION BY MR. RILEY.

Q You say you were an agent for the C. & E., Mr. Nowers? A. Yes, the Calgary & Edmonton Land Company, and the Innisfail townsite.
Q And that was back in 1905? A. In 1904, '05 and '06, up to 1909.
Q Yes. And in those days did the C. & E. have a printed form of agreement? A. I think so. The only agreements that I recall were printed forms.
Q How long did you stay as an agent of the C. & E.?
A I just stayed from 1904 to 1909, until the end of April, I think.
Q In those days the C. & E. agreement reserved all mines and minerals? A. I could not tell you now.
Q Well, is there any way that you can check so that you would be able to tell me? A. I do not think so. They may have varied in that time, and in those days at Innisfail it was not considered of any great importance, other than coal. Coal was found at Three Hills.
Q Have you been interested, sir, in acquiring any petroleum and natural gas leases? A. Yes, sir.
Q All through the years? A. Well, I would not say all through the years.
Q Have you ever seen a lease of petroleum alone?
A I do not know that I have.
Q It has always been petroleum and natural gas?
A Not necessarily, no, but I do not recall any that used the word "petroleum" alone.
Q Alone? A. But they have varied on that.
Q The Government leases have varied? A. No, I do not say the Government leases. They are not all Government leases. For instance, I sold 1440 acres of land in 1921, in January, for the Wright Estate to MacKay Brothers in the north end of that valley, and most of that land carried mineral rights.
Q That is a different thing, isn't it, though?
A And they are leases, those leases are private leases. They are different from the Government leases. As a matter of fact, some of them were 999 years the MacKay Brothers made.
Q Your mind has never been particularly directed towards the meaning of the word "petroleum"? A. Not particularly. I had often heard discussions. I have listened to geologists speak at various times on the geology of Turner Valley. I suppose I have,

perhaps more than the average man.
Q Could I have Exhibit 81 for a minute? You have done work and especially valuations for the C.P.R. over the years? A. I have made valuations for the Dominion Government and the Provincial Government.
Q I am asking you for the C.P.R.? A. Yes.
Q You are pretty familiar with the C.P.R. practice and procedures? A. In what?
Q In land valuations and things of that nature?
A No, my land appraisal work for the C.P.R. has been mostly in connection with assessments.
Q Now, sir..... A. And some foreclosures.
Q I am showing - a great number of foreclosures?
A No, I haven't made a great number of foreclosures for them.
Q All right. I show you now Exhibit 81, headed "Canadian Pacific Railway Company, Department of Natural Resources"? A. Yes.
Q "Regulations for the Disposal of Petroleum Rights, the Property of the Canadian Pacific Railway Company in the Provinces of Manitoba, Saskatchewan, Alberta and British Columbia". A. Yes.
Q And I should tell you that this document has been in existence from 1914 on? A. Yes.
Q Now, you observe this "Regulations for the Disposal of Petroleum Rights", and your idea of that would be that a person acquiring rights pursuant to these regulations would have the natural gas? A. Most assuredly, sir. I might say that was the common understanding that the two were interlocking, and they would go together. I never heard it questioned.
Q Well, this is probably the first time it has been. Well, will you read to yourself paragraphs 7 and 13? A. Pardon?
Q Paragraphs 7 and 13? A. Yes.
Q Now, we will just leave that for a moment. I will ask you one question when I am through. I now show you Exhibit No. 58, and I do not want you to read the whole of it, but this is a lease, what is called a gas lease, dated the 13th of June, 1949, by which Canadian Pacific Railway Company leases to Mr. Sorensen and associates, of Tilley, in the Province of Alberta, all natural gas which may be found within, upon or under the leased area for the sole purpose of drilling and operating for, producing, removing and using the same for personal domestic purposes. A. Yes.

Q In other words, this is a document where they lease the natural gas rights to this farmer. Now, I call your attention to paragraph 8, is it not, in this document, "Should the lessees", that is, the farmer, "in the course of their drilling operations for natural gas on the leased area develop a flow of petroleum, they shall forthwith take all necessary steps to conserve the flow of petroleum, and insofar as is possible, prevent the wastage of same, and shall forthwith notify the lessor and surrender the within lease to the lessor." In other words, the farmer has the right to go and look for gas, but if he finds petroleum he has got to give it up. Now, we will look at Exhibit No. 56, and perhaps you will take my word for it that that is similar to Exhibit 58, only with another man? A. And the land is where?

Q Down at Tilley. They are all around the same place. And Exhibit 54, and perhaps again you will be good enough to rely on my word that it is the same kind of a document. Now, is it not fair to say, Mr. Nowers, that whatever your understanding may have been, the C.P.R.'s understanding was different?

MR. HELMAN: My lord, I object to that question.

A I would not say.

MR. HELMAN: I object to that question because I think my friend's interpretation of the document is not right. I have not objected to it, but it says that it gives a certain man gas, and it says with regard to encountering a flow of petroleum, and, my lord, it does not necessarily follow that my friend's argument is correct that that must mean liquid oil and liquid oil alone.

A Well, I can quite understand - I might make this statement. I can quite understand a gas lease in the Medicine Hat area where oil has not been found. The first well was drilled in that area some time in the '80's, and when I first came to Calgary in 1902, late in 1902, East Calgary was lighted with natural gas, and I have been conversant with that end of it, and I think that in that area that is quite a reasonable thing to lease natural gas there. However, that is only my own opinion.

Q MR. RILEY: You say you have been associated with oil companies? A. No, I am not associated with any.

Q Were you at any time in your career? A. No, I

never have.
Q Have you been associated? A. I have had shares in oil companies.
Q I do not mean that. A. I have never been in the class of a promoter of any kind in any company.
Q Have you bought or acquired petroleum and natural gas interests on your own? A. Yes, I have an interest in one now, one-eighth interest.
Q And what did natural gas mean to you? A. Well, it has not meant anything, unfortunately.
Q I do not mean in dollars and cents, I mean in wording, sir? A. Well, I do not quite understand the connection.
Q Well now, you have got a petroleum and natural gas lease, haven't you? That is the kind of a lease you got? A. I think it is.
Q What do you think the natural gas meant? A. Just the same as the petroleum.
Q Just the same as the petroleum? A. Yes. I think it is a safeguard. They might have added two or three more things.
Q As the lawyers say, "Out of abundant caution", that is right, isn't it? A. Yes, I would think so.
Q I see. A. To me it did not make it any different, any stronger.
Q All right, sir.
THE COURT: Any more questions?
MR. NOLAN: No, sir.
MR. HELMAN: Just a moment. That is all, Mr. Nowers.
THE COURT: Thank you, Mr. Nowers. Next?

STANLEY JAMES DAVIES,
having been first duly sworn, examined by Mr. Helman, testified as follows:
MR. HELMAN: Will your lordship permit this witness to be seated?
THE COURT: Yes.
Q MR. HELMAN: Mr. Davies, your are a petroleum engineer? A. Yes, sir.
Q And will you just tell us what your education has been, what education you have had and what your qualifications are? A. I attended the University of Alberta in the year 1913 and the year 1914, and took second year and part of the third year, then the following year I worked for the Canadian Geological

Survey in Turner Valley, that was the spring of 1914. In the following year I joined the Army and went Overseas. At the conclusion of the war in 1919 I received a credit for my university work at the University of Alberta and attended the Royal School of Mines, which is the school in the Imperial College of Science and Technology in London, England, where I spent two full years, and graduated as an Associate of the Royal School of Mines in the Technology of Oil. I belong to a number of societies, The Professional Engineers of the Province of Alberta, a member of the Engineering Institute of Canada, a member of the Alberta Society of Petroleum Geologists, and a member of the Canadian Institute of Mining and Metallurgy.

Q Now, you have been engaged actively in connection with the problems relating to petroleum in Alberta?

A Yes, sir.

Q And I think for a time you were with the Department of Mines? A. I was with the Department of the Interior as petroleum engineer in Calgary in the year 1925 and part of the year 1926.

Q And you have recently been a consultant for the City of Calgary in connection with the Gas Inquiry?

A That is right. Since the year 1926 I have been consultant to the City of Calgary on technical matters in connection with natural gas rates and natural gas reserves.

Q Now, will you just tell us, Mr. Davies, what does the word "petroleum" import to you? A. The word "petroleum" to me means a mixture of hudrocarbons, gaseous, liquid and solid.

Q Just one moment, my lord. Just answer my learned friend.

CROSS-EXAMINATION BY MR. STEER.

Q There isn't any doubt in your mind, Mr. Davies, that natural gas is a commodity of commerce?

A No, sir.

Q And there isn't any doubt in your mind that natural gas as a commodity of commerce can be obtained from places in this Province where there is no crude oil whatever? A. That is correct.

MR. HELMAN: I was going to ask the witness one more question. Perhaps I could interrupt?

MR. STEER: Yes.

Q MR. HELMAN: You have been for some

years the managing-director of a gas company?
A Since 1936, with the exception of four years in the Army, from 1940 to 1944.
Q MR. STEER: And the natural gas which goes into commerce can come from fields like Viking-Kinsella and forty or fifty other fields in this Province, where there is no oil, is that correct?
A I would be doubtful of those forty or fifty fields, Mr. Steer, but it would come from a number of fields.
Q Quite so. I do not care so much about the number. We were told by Dr. Govier in the Dinning Commission, I think, that there were no less than sixty different fields or places in Alberta from which this dry natural gas could be obtained. Now, you say there are at least some, is that right? A. That is right.
Q And other natural gas that goes into commerce will be obtained from the outlet of some kind of an absorption plant? A. That is right.
Q And other natural gas that goes into commerce will be obtained from the outlet of such a plant as the Imperial Conservation Plant at Leduc, it is there simply for the purpose of conserving gas? A. That is right. Mr. Steer, I think that you are narrowing the words "natural gas" down to principally the hydrocarbons, methane and ethane, and perhaps some other small proportions, but the word "natural gas" correctly includes such gases as carbon dioxide, hydrogen sulphide and other impurities, those being the two principal ones.
Q I appreciate that, and we have had evidence to that effect, Mr. Davies. And this natural gas that comes out of such a conservation plant as that at Leduc, and passing into commerce, issues from the mouth of the bore holes in wells drilled in the Leduc area?
A That is correct.
Q And has passed through certain equipment for treatment and eventually issues as natural gas, dry natural gas? A. First the equipment for separation.
Q Quite so. A. And then through compressors which further separate.
Q Yes? A. But I do not think the plant at Leduc actually goes to the extent of treatment, Mr. Steer.
Q Yes. When first did you arrive at this conception of petroleum as inclusive of natural gas? When first? A. I gave evidence in court here in Calgary in the year 1935 to the same effect.
Q In the Knight Sugar case?

MR. HELMAN: No, that was not the case. It was the case in connection with the Merland Oil Company.

MR. STEER: Oh, yes.

A And in the year 1925

Q Oh, I thought you said 1935. You said '25?

A No, sir. The case was in 1935. I am continuing now to go back to give some idea of the time and reasons for my opinion with regard to the definition of petroleum. In the year 1925 I was appointed Petroleum Engineer for the Department of the Interior dealing with both oil and natural gas. At that time, no doubt, the Court is aware that the Northwest Territories had oil and gas regulations. As Petroleum Engineer for the Department I dealt with both natural gas and oil. Further back, in the year 1914, I was then about 21 years of age, and I can not say that my ideas were definite, but all my experience was with oil wells on one hand and gas wells on the other hand. One of my tasks was to collect samples from the various wells drilling in Turner Valley at that time. Now, my particular background has been to be associated with people who came from Ontario, my family, if you like, and their conversation about oil wells and gas wells, and in time the word "petroleum" came up, and it is not in my conception to speak of a petroleum well unless you speak of both.

Q I see. Now, Mr. Davies, you seem to differ from some of the people who were employed with you, or prior to your time, with the geological survey? A. Mr. Steer, as far back as I can go in associating the idea of oil and gas, and that is with the discussions with various chiefs of parties, such as D.B. Dowling and others, and I was quite a young man in those days.

Q Well, I will ask you if you will confine your evidence to your own experience and not endeavour to tell us what Mr. Dowling had to say. We have reports as to that.

MR. HELMAN: Well, but discussions that this witness had with Mr. Dowling, if he is being cross-examined as to his knowledge, is surely evidence.

MR. STEER: But, surely, what Mr. Dowling told him would not be evidence.

THE COURT: I think he was just approaching the point where he meant to convey the effect that Mr. Dowling had on him as a young man.

A Correct, my lord. I learned from these people by

reason of sitting around, mostly around the camp fires, and hearing them discuss what their views were, as one would sit in class, listening to a professor.

Q MR. STEER: I see. Well, in the first place, I am going to ask you to look at this Exhibit 134, and I am going to ask you to look at Mr. Stirling's letter of transmittal to the Provincial Secretary, I am going to ask you to look at Dr. Allan's letter of transmittal, and I am going to ask you to look at the nature of the report.

A Is there any particular page, Mr. Steer?

Q No, just if you will look, what I suggest to you, Mr. Davies, if you will look at that, what I suggest to you is that that report of Dr. Allan's in 1920 obviously is a study of the mineral resources of Alberta? A. Right.

Q Is that right? A. That is what it says, yes, sir.

Q And with reference to 18 different minerals in his letter of transmittal -

MR. HELMAN: It is not his letter of transmittal, it is Mr. Stirling's letter.

MR. STEER: Well, if my friend would not be so confident about it, the letter that Mr. Allan wrote is the letter that was addressed to Mr. Stirling enclosing the report, and then Mr. Stirling sent the report on to the Provincial Secretary.

Q Am I right in that, Mr. Davies? A. The first letter is signed by John T. Stirling, and this enumerates a number of minerals.

Q A number of minerals? A. Yes.

Q And the second letter? A. And the second letter does not make any particular enumeration of the minerals in the letter of transmittal. It may be in the body of the report.

Q To whom is the second letter addressed? A. To John T. Stirling.

Q And I call your attention to the first paragraph of the letter referring to 18 minerals, is that right?

A That is Mr. Stirling's letter. That is correct.

Q Read that paragraph of Dr. Allan's letter? A. Oh, yes.

Q To Mr. Stirling? A. The report is made up "of separate bulletins on 18 different minerals which are known to occur in Alberta".

Q Now, if you will look at the table of contents in the back, I take it, or, I think you can take it

that you have got 18 different minerals that Dr. Allan was referring to? A. Correct.

Q And I would like you to go through them and tell me whether natural gas and petroleum are included there as separate minerals? A. And bitumen. Three, bitumen, natural gas and petroleum.

Q Are included in different parts of the report?

A Right.

Q As separate minerals? A. Right.

Q I want to get your language Mr. Davies. Would you think that in this passage in this book here, Number 29-E - A. Yes.

Q - headed "Oil and Gas Prospects of the Northwestern Provinces of Canada" by White Malcolm, on page 5 Mr. Dowling writes this portion of the report, and uses these words, you can follow them anyway:

"Little has been done yet to test the gas and oil possibilities of the district".

A Correct.

A He is drawing a distinction there between oil which you identify with petroleum, I take it, liquid petroleum, the same thing? A. No, I do not, Mr. Steer. I said that petroleum included both.

Q I know you did, but the word "oil" here would be liquid petroleum in your language? A. The word "oil" there would be oil, straight oil.

Q Liquid petroleum, crude petroleum, crude oil?

A Now, we can get a variation here, Mr. Steer, of any number of combinations. I just want to think carefully of my answer. Petroleum embraces all the hydrocarbons.

Q And oil? A. Well, you have oil in the form of gas at one time, liquid at another time, depending on temperatures and pressures. It is not something like the table and the carpet, or something like that. They change back and forward in their states, depending upon pressures and temperatures.

Q Now, I wonder if you would agree with this, this was stated with regard to the oil that was found in oil springs near Petrolia in Ontario.

"The gas and the oil....."

MR. HELMAN: Who is the author and the date?

MR. STEER: It happens to be the judgment of Lord Atkinson in Barnard-Argue against Farquharson and it is in 1912, Appeal Cases, page 869, at the bottom of the page.

Q "The gas and the oil are in their chemical composition no doubt both hydrocarbons, but they are distinct and different products." Do you agree with that? A. I will agree with that, yes, Mr. Steer.
Q Yes? A. Commercial products, I think, that is quite true.
Q Now, I am going to call your attention to the fact that as late as 1949 it appears, and I want to discuss this with you, it appears that the Canadian Pacific Railway Company regarded natural gas and petroleum as separate things, because we have got three examples here of leases made by the Canadian Pacific Railway Company to farmers of the right to recover natural gas from legal subdivisions. Do you follow me? A. Correct.
Q The right to recover natural gas to use about their premises? A. Right.
Q And then the lease provides - will you follow it please? A. Yes.
Q "Should the lessees in the course of their drilling operations for natural gas", that is quite clear, isn't it? A. That is right.
Q "....on the leased area develop a flow of petroleum"?
A. Correct.
Q What does that mean? A. Well, now, to me that would mean that could be petroleum in the sense that I gave you the definition.
Q I see. A. A combination of gas and liquid and, therefore, they would have to do something about it.
Q It does not mean a flow of liquid? A. Solely, no.
Q But there is a contrast there between natural gas and the flow of petroleum isn't there? A. Oh, yes, in the wording, quite true.
Q And it is quite conceivable, that the man who drew that document had that in mind, that there were two substances, one was known as natural gas and the other was known as petroleum, and that those were the two things he was talking about? A. That could be true.
Q That could be? A. In somebody else's mind.
Q In somebody else's mind? A. Yes.
Q You are giving your own view? A. Quite right, Mr. Steer.
Q I gather that that view of yours, even among highly technical people, is of very recent origin, but

you have a different view? A. It is not so very recent, because it is in my lifetime and I have given you the reasons and the times, so that it is nothing that happened yesterday.

Q I wonder if you agree with this, which I find in the report of the Dinning Commission, at page 19, "Natural gas as produced from the well may be divided into two separate categories: (1) Dry gas, and (2) wet gas." I suppose you agree with that?

A That is correct.

Q "Dry gas is defined as natural gas which does not contain an economically recoverable content of liquid hydrocarbons", is that right? A. That is correct.

Q "...and which usually is not associated in the reservoir with commercial quantities of liquid petroleum, that is, crude oil"? A. Well, I am not so sure about that.

Q You think you might differ there? A. I might differ there, yes.

Q "Wet gas is defined as natural gas which contains an economically recoverable content of liquid hydrocarbons and which may or may not be associated with commercial quantities of liquid petroleum in the reservoir". A. I think that is right.

Q Is that all right? A. I think so.

Q "Wet gas may be further classified as..." and so on. Now then, "Solution gas is gas which, under reservoir conditions, exists in solution with the liquid petroleum". You would agree with that?

A Yes, I would agree with that.

Q "Depending upon the reservoir conditions, liquid petroleum in the reservoir may have dissolved in it anywhere from less than 100 to more than 1,000 cubic feet of natural gas per barrel of liquid." Do you agree with that? A. Yes, depending on the amount of pressure and temperature.

Q That is, gas is, therefore, produced unavoidably along with liquid petroleum? A. It is the means of producing the liquid petroleum.

Q Unless there is, perhaps, a water drive?

A Even so, if the pressure is kept up.

Q We are told that there is a water drive in Leduc?

A Quite so.

MR. HELMAN: Just let the witness answer.

A The water drive in Leduc, the record is that the pressure is dropping slightly. It is not absolutely

even, therefore, it depends upon the rate at which the reservoir fluids are withdrawn from the reservoir whether that pressure is kept up or not, therefore, if there is any drop in the reservoir pressures at all, there promptly would be an expansion of the natural gas in the solution.

Q An escape of gas in solution? A. Yes, at bubbling point.

Q "Gas cap gas is gas which, under reservoir conditions, overlies the liquid petroleum. Since this gas is physically separated from the liquid petroleum in the reservoir, it need not be produced along with the liquid petroleum." Do you agree with that?

A Yes, that is right.

Q Yes. That is all, thank you.

THE COURT: Anything more, Mr. Nolan, any more questions?

MR. NOLAN: Nothing, thank you.

THE COURT: Mr. Helman?

MR. HELMAN: No, My Lord.

THE COURT: All right, next witness.

MR. CHAMBERS: My Lord, on behalf of the Defendant, Imperial Oil, I would like to tender as an Exhibit a duplicate original of the Order granted by Mr. Meldrum, the Chairman of the Right of Entry Arbitration Board, which is dated Monday, the 28th of November, 1949, and it gives the Imperial Oil the right to go on the land subject to the compensation being later adjusted and fixed by the Chairman of the Board.

THE COURT: I suppose there is no objection?

MR. RILEY: Not so long as we do not read into the order more than there is in it, sir. I had the pleasure of being before that Board with my friend Mr. Nolan, and we were told that that was not the place to argue that problem, and all that the Board could fix was with reference to the compensation.

MR. CHAMBERS: Well, I am just tendering the Order.

THE COURT: If there is no objection to my marking it as an Exhibit I will mark it as an Exhibit.

MR. RILEY: Not with that explanation, sir.

THE COURT: All right.

MR. STEER: I would take it that the Order with regard to the Right of Entry arbitration,

that does not affect in any way the injunction which is outstanding in this case.

BOARD OF ARBITRATION ORDER RE RIGHT OF ENTRY ARBITRATION ACT MARKED ECHIBIT 136.

MR. HELMAN: My Lord, I would like to mention to Your Lordship about Dr. Allan. I had Dr. Allan here for several days under a subpoena and he is too ill to give evidence, My Lord, he told me that yesterday, and we permitted him to return home. He said he was too ill to go into the witness box and for that reason we have not called him. I wish to make that explanation to Your Lordship in view of some of the remarks that have been made with regard to some of his reports.

MR. STEER: I would suggest, My Lord, I have no objection whatever to my learned friend making the explanation as to why Dr. Allan is not called, but I suggest that he should not have his remarks appear in this record.

MR. HELMAN: I am letting it appear in view of His Lordship's remark that he saw him sitting here.

THE COURT: I saw him sitting here, and all I said was that I did. I do not propose to be criticized for what I said.

MR. HELMAN: I am not criticizing Your Lordship in the least.

THE COURT: I simply said that I saw him. That I did not know of any reason why he should not be called.

MR. HELMAN: Yes, My Lord.

THE COURT: I am going to allow it to stand on the record that he is ill and cannot be called.

MR. NOLAN: So far as the Defendant Imperial Oil Limited is concerned, My Lord, that concludes the evidence which we have to adduce.

THE COURT: And what about the Plaintiff with regard to rebuttal?

MR. STEER: We have no rebuttal, My Lord.

THE COURT: And what about the C.P.R.?

MR. HELMAN: We have concluded our case too.

THE COURT: Is everybody satisfied that you have put in all of your evidence?

MR. STEER: Yes, My Lord, and I think we should express our gratitude to you for the care and attention and the long hours that you have put in on this case.

THE COURT: No necessity for that, Mr. Steer, I am doing just what I am paid to do. Now, then,

is there any need for us coming back this evening? Are we finished with all of the evidence in this case?

MR. NOLAN: Yes, My Lord.

THE COURT: Then there is no necessity for us coming back this evening or tomorrow.

MR. NOLAN: No.

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IN THE TRIAL DIVISION OF THE
SUPREME COURT OF ALBERTA
JUDICIAL DISTRICT OF CALGARY

No. 46478

BETWEEN:

MICHEAL BORYS,

Plaintiff

- and -

CANADIAN PACIFIC RAILWAY COMPANY
- and -
IMPERIAL OIL LIMITED,

Defendants.

REASONS FOR JUDGMENT
of Chief Justice W.R. Howson.

On the 13th day of September, A.D. 1906, at a time when the Canadian Pacific Railway Company was the registered owner of the North East Quarter of Section 19, Township 50, Range 27, West of the 4th Meridian, without any reservation or exception, it made a written contract with Simon Borys, the father of the plaintiff and a predecessor in title to the plaintiff, to sell to Simon Borys the said land for the sum of $1,280.00, payable with the interest and by the instalments, as particularly set out in that agreement, Exhibit 2.

Previously in the year 1901, Simon Borys bought from the defendant Canadian Pacific Railway Company an adjoining quarter being the North West Quarter of Section 19, Township 50, Range 27, West of the 4th Meridian, by an Agreement for Sale for the sum of $3.00 per acre or $480.00.

In the earlier agreement no reservation was made of petroleum.

In the agreement material to this action Borys on performing all conditions on his part to be performed became entitled to a deed or patent conveying the said premises in fee simple.....but subject to the reservations, limitations, provisos and conditions expressed in the original grant from the Crown (there being in fact none) "and reserving all coal, petroleum and valuable stone on or under the said land", the said reservation of coal, petroleum and valuable stone being one in favour of the defendant Canadian Pacific Railway Company.

Pursuant to that agreement, on the 17th day of January, A.D. 1918, by Exhibit 3, Canadian Pacific Railway Company executed a transfer in favour of Mr. Simon Borys of the said North East Quarter of Section 19, "reserving unto Canadian Pacific Railway Company, their successors and assigns all coal, petroleum and valuable stone which may be found to exist within, upon or under the said land".

On the 19th day of November, A.D. 1920, Simon Borys was recorded under Certificate of Title No. 243-M-50 issued by the Registrar of the North Alberta Land Registration District as being registered as the owner of an estate in fee simple of the North East Quarter of Section 19, containing 159 acres more or less, and reserving unto the Canadian Pacific Railway Company all coal, petroleum and valuable stone as shown by Exhibit 4.

By various conveyances, which I do not think important, the present plaintiff, Micheal Borys, the son of Simon Borys, became the owner of the estate originally acquired by Simon Borys. The plaintiff's ownership was recorded by Certificate of Title No. 165-N-120 issued by the Registrar of the North Alberta Land Registration District under date the 18th day of December, A.D. 1947.

In and by paragraph 7 of the Statement of Claim, the plaintiff alleges that:

> "Petroleum by definition, reservation, custom, usage and in fact, is an oily inflammable liquid or mineral oil usually of a dark brown or greenish hue, and under the facts and circumstances existing herein does not embrace or include natural gas, the said natural gas in its physical properties

"being very different from petroleum and the said natural gas being in fact a separate and distinct substance from petroleum."

The plaintiff seeks inter alia:

(a) A Judgment declaring that the plaintiff is the owner of the natural gas within, upon or under the said lands;

(b) An interlocutory and permanent injunction restraining the defendants and each of them and each of their servants, agents, contractors, successors and any one on their behalf from using, removing, wasting, interfering with or otherwise disposing of in any manner the said natural gas.

The Statements of Defence of the defendant, Imperial Oil Limited and Canadian Pacific Railway Company are substantially similar. In paragraph 5 of the Statement of Defence of Imperial Oil Limited it is contended that natural gas within, upon or under the lands in question is embraced within the reservation of the word "petroleum", and it is further contended in paragraph 8 of the Statement of Defence that by virtue of its lease from Canadian Pacific Railway Company, Imperial Oil Limited has the right to work, win and carry away petroleum in any or all of its forms of occurrence, including its gaseous phase, or so-called natural gas, which may be found within, upon or under the said lands.

Alternatively, Imperial Oil Limited contends that "if it has not the right to work, win and carry away natural gas which may be found within, upon or under the said lands", then it has the right to work, win and carry away:

(a) the natural gas occurring in the same reservoir with the petroleum in its liquid phase; and

(b) the natural gas that may be contained in solution in petroleum in its liquid phase; or

(c) without compensation, to remove, appropriate, convert, use and dispose of such natural gas, or any other substances as may be necessary

or incidental to work, win or carry away the petroleum in its liquid phase which may be found within, upon or under the said lands. (Statement of Defence, paragraphs 9, 10 and 11.)

Imperial Oil Limited by counterclaim claimed:

(a) that the plaintiff by counterclaim, Imperial Oil Limited, has the right to work, win and carry away petroleum in any or all of its forms, including its gaseous phase, or so-called natural gas, which may be found within, upon or under the said lands;

(b) a Judgment declaring that the plaintiff by counterclaim, Imperial Oil Limited, has the right, without compensation to the defendant by counterclaim, to remove, appropriate, convert, use and dispose of such natural gas as may be necessary or incidental to work, win or carry away the petroleum within, upon or under the said lands;

(c) in the alternative, a judgment declaring that if the plaintiff by counterclaim, Imperial Oil Limited, has not the right to work, win and carry away the natural gas, it has the right to work, win and carry away the natural gas occurring in the same reservoir with the petroleum in its liquid phase within, upon or under the said lands; and

(d) in the further alternative a Judgment declaring that if the plaintiff by counterclaim, Imperial Oil Limited, has not the right to work, win and carry away the natural gas, it has the right to work, win and carry away the natural gas contained in solution in the petroleum in its liquid phase within, upon or under the said lands.

By his reply the plaintiff alleges that having regard to the time at which the defendant, Canadian Pacific Railway Company, reserved the coal, petroleum and valuable stone within, upon or under the lands in question, and the facts and circumstances then existing, it was not the intention of the parties, as revealed by the language used, to reserve the natural gas. Further, the plaintiff alleges that if the defendants have the right, without compensation to the plaintiff, to remove, appropriate,

convert, use and dispose of the natural gas then the plaintiff has a correlative, corresponding and similar right, without compensation to the defendants, to remove, appropriate, convert, use and dispose of the petroleum incidental to the plaintiff's working, winning or carrying away the natural gas.

The major question for decision is, "having regard to the time at which the documents between the parties were executed and the facts and circumstances then existing, what did the parties to the documents intend to express by the language which they have used, or in other words, what was their intention touching the substances to be accepted as revealed by that language?" (See Barnard-Argue-Roth-Stearns Oil and Gas Company Limited v. Alexander Farquharson, (1912) A.C., page 864, at page 869.)

In applying that test, difficulties arise in the case at bar. Counsel for the defendant, Imperial Oil Limited, in his written argument, makes the following submission:

> "Furthermore it will be submitted that the relevant instrument to be construed in this case is the transfer from the Canadian Pacific Railway Company to Simon Borys dated the 17th day of January, A.D. 1918, and that while the Court may look at the terms of the land contract entered into between the above mentioned parties in 1906 to interpret the language of the transfer in 1918 it is unnecessary to do so because the language of both documents is substantially the same."

Counsel for the defendant, Canadian Pacific Railway Company, on the other hand, suggests that the meaning of the reservation at the present time is the meaning which governs.

Hence, it may be of some importance that these submissions be kept in mind when one comes to consider the admissibility of the evidence as submitted by all parties at the trial.

The Court should consider, among other matters, what the parties to the agreement for sale in 1906 (as carried out in the transfer of 1918) had in their minds.

It is manifest that Simon Borys did not understand petroleum in any wider sense than oil. He could neither read nor write the English language. There was no Ukrainian word for petroleum and the nearest Ukrainian word is the word "olivha" which in English means oil. It is observed that Simon Borys still cannot adequately talk and understand English and had to give his evidence through an interpreter.

Natural gas as a separate and distinct substance or product or mineral was generally known in 1906 and was likewise known in the Province of Alberta. Indeed, as early as 1891 the Courts of the Province of Ontario had determined that natural gas was a mineral. In the Province of Alberta, however, it was not in the year 1906 regarded as a substance of commercial value and even at a later date it was regarded as a dangerous nuisance - a thing to be got rid of - a substance blown to the air in the hope that mineral oil would follow. Some of the witnesses referred to the famous Turner Valley field in the Province of Alberta as a classic example of the wastage of natural gas. Further, the Canadian Pacific Railway Company did not specify natural gas in any of its reservations until in or about the year 1911 (see Exhibit 82) which date roughly corresponds to the commercial usage of natural gas in this Province.

Further, the exhibits clearly prove that when the defendant, Canadian Pacific Railway Company desired to reserve or except the natural gas they did so by using apt and indeed express language. Further, one cannot read Exhibits 77 - 83 inclusive, without coming to the conclusion that the defendant, Canadian Pacific Railway Company at all times material, regarded petroleum as the equivalent of mineral oil and that natural gas was regarded by the said defendant as a distinct and different product or substance or mineral and not included within the word petroleum.

It was no doubt because of the difficulty in construing petroleum in a fashion to embrace natural gas that in the master agreement between the defendant Canadian Pacific Railway Company and the defendant Imperial Oil Limited (Exhibit 79) the Canadian Pacific Railway Company made it plain that the Imperial Oil Limited could only acquire such interest as was possessed by the Canadian Pacific Railway Company.

The useful function performed by natural gas in the production of petroleum by reducing its viscosity, by moving it to the bore hole, etc., was a much later discovery and while it was undoubtedly known prior to 1906 that natural gas and mineral oil were found in some cases to impregnate the same subterranean porous stratum and that, when this stratum is tapped by a pipe or boring leading to the surface, the gas in its escape to the upper air helps to bring up to the surface with it some of the mineral oil, the modern science of what is known as "reservoir engineering" was neither known nor practiced.

If, on the other hand, I were to accept the evidence of the witnesses, Lewis, Fancher, and Katz (each of whom impressed me as being somewhat partisan and further evasive on cross-examination) as to the state of knowledge in 1906, which I take to mean general knowledge, and I do not, the deliberate omission to specify natural gas by the use of apt words leads to the conclusion that Canadian Pacific Railway Company did not intend to include it in the reservation. It can scarcely be conceived that if it were intended to include it in the substances reserved it would have been left to be covered by the general word "petroleum" upon which the argument is now hung.

At the time the agreement in question was entered into, as carried out by the transfer of 1918, mineral oil was the primary and indeed the sole object of the reservation.

Turning now to the meaning given to the word "petroleum" in common parlance "or in the vernacular of the mining world, the commercial world and land owners", or in the "popular sense" or in the language of "plain men", it has been proved:

1. That petroleum does not include natural gas but is the equivalent of crude oil.

2. That natural gas is regarded as a distinct and different product from petroleum.

Indeed, any other construction is entirely opposed to the spirit of the system of reservations and proprietorship of land in the Province of Alberta; the leasing of petroleum and natural gas rights in the

Province of Alberta; the treatment of the two substances by legislation, both Dominion and Provincial, and regulations pursuant thereto; the literature of this country - my attention was drawn to the book written by the eminent Canadian geologist, T. Sterry Hunt in 1861 on the "History of Petroleum of Rock Oil". My attention was further drawn to the various geological surveys and writings, to the treatment of petroleum and natural gas as two separate minerals in the Canada Year Book throughout the years, to Exhibit 135 showing the present treatment of petroleum and natural gas as two separate and distinct minerals, to Exhibit 134, being the report by Dr. John A. Allan to the Government of the Province of Alberta on the minerals within this Province.

As the witness Julian Garrett, a man of wide experience stated on cross-examination:

Q Now, perhaps you will go this far with me, and you have been in this court room long enough to know that we are advocating one usage of the word and the plaintiff is advocating another usage of the word?

A Yes.

Q There were two usages? There were two usages of that word known to you?

A No.

Q Are you telling me -

A Not until I heard of this case.

Q Oh. Well then, if I asked you for a word that would comprise both oil and natural gas, just one word, what word would you use?

A I could not assign any word to it because I think they are both separate substances.

Q Well, if I assigned the word "petroleum" to both of those substances, would you agree that that was proper terminology?

A No, I would not.

Q You will not agree with me that there is a scientific meaning and that that scientific meaning included all the hydrocarbons occurring in nature, whether gaseous, liquid or solid?

A No. I have been in the natural gas business for over 27 years. I am a member of the American Gas Association, the Natural Gas and Petroleum Association of Canada, the

Canadian Gas Association, and the Pacific Coast Gas Association, and I have never in all my experience until this case arose heard of natural gas being construed as meaning "petroleum".

Having recourse to dictionaries, it may suffice to quote from several, some of which are American and some of which are English, but all of which are authoritative and I accept.

FUNK AND WAGNALL'S NEW STANDARD DICTIONARY, complete Edition 1914. This is an English and American work. Petroleum is defined at page 1849:

"An inflammable oily liquid mixture of numerous hydrocarbons, chiefly of the paraffin series, that exudes from the earth and is extensively used for heat and light;"

Crude is defined at page 622:

"Crude - (1) in a state needing preparation for use in manufacture or mercantile exchange; not refined; unprepared by any process; raw; as crude petroleum; crude material, a relative term."

and Oil is defined at page 1715:

"Oil n. A neutral liquid usually of either vegetable or animal origin, but sometimes of mineral origin, that is insoluble in water, but sometimes soluble in alcohol, and always in ether..... Mineral oils form a class somewhat by themselves and include petroleum and oils distilled from peat, shale, etc. They are generally thought to have been formed by the decomposition of animal and vegetable remains, although petroleum is regarded by certain writers as Mendeleeff, as of purely mineral origin."

WEBSTER'S INTERNATIONAL DICTIONARY, 1897, an American work. Petroleum is defined at page 1073:

"as rock oil, mineral oil, or natural oil - a dark brown or greenish inflammable liquid which at certain points exists in the upper strata of the

"earth from whence it is pumped or forced by pressure of the gas attending it. It consists of a complex mixture of various hydrocarbons, largely of the methane series but may vary much in appearance, composition and properties. It is refined by distillation and the products include kerosene, benzene, gasoline, paraffin, etc."

WEBSTER'S NEW INTERNATIONAL DICTIONARY, unabridged, 2nd Edition, 1934. Petroleum is defined at page 1883:

"Petroleum from Latin petra, a rock and oleum, oil. An oily, inflammable liquid, almost colorless to black, but usually of a dark brown or greenish hue existing at many places in the upper strata of the earth - petroleum is usually obtained by pumping or is forced out of drilled wells by the pressure of the gas occurring with it."

Natural gas is defined at page 1631:

"A gas issuing from the earth's crust through natural openings or bored wells and frequently accompanied by petroleum."

The specific definition of the term oil is petroleum, see page 1692.

"Crude n. A crude substance specif. a. petroleum as extracted from the ground: crude oil." p. 635.

THE SHORTER OXFORD ENGLISH DICTIONARY in 2 Volumes, 1933. Petroleum is defined as follows at page 1483:

"Petroleum, a mineral oil, varying from light yellow to dark brown or black, occurring in rocks or on the surface of water in various parts of the world, used especially as a source of oils for illumination and mechanical power; rock oil."

A NEW ENGLISH DICTIONARY ON HISTORICAL PRINCIPLES: (In the Oxford Dictionary, 1909). Petroleum is defined in Vol. 7, page 753:

"Petroleum, a mineral oil varying from light yellow to dark brown or black, occurring in rocks or on the surface of water in various parts of the world, in modern times of great economic importance especially as a source of oils for illumination and mechanical power, rock oil."

In Vol. 7, at page 92, oil is defined as follows:

"The oils constitute a very large group of natural substances of animal, vegetable or mineral origin. They are divided into three classes (1) Fatty or fixed oils..... (2) Essential or volatile oils.... (3) Mineral oils which are chemical mixtures of hydrocarbons and are used chiefly as illuminants."

UNIVERSAL DICTIONARY OF THE ENGLISH LANGUAGE, 1932, an English publication. Petroleum is defined as follows at page 855:

"Petroleum, inflammable mineral oil found in the crust of the earth in certain regions, used for illumination and for driving certain types of engines."

CENTURY DICTIONARY, 1911, an American work, petroleum is defined at page 4428:

"Petroleum, an oily substance of great economical importance, especially as a source of light, occurring naturally oozing from crevices in rocks or floating on the surface of the water, and also obtained in very large quantity in various parts of the world by boring into the rocks, rock-oil."

Definitions from numerous technical and scientific works were likewise given in evidence and it is significant that the definitions from the technical and scientific dictionaries corresponded substantially with the definitions from standard dictionaries quoted supra, and in no instance, even in the technical dictionaries, was petroleum defined so as to include natural gas as suggested by the defendants' witnesses.

By way of example, reference is made to the Condensed Chemical Dictionary, an American work, published in 1930, which the witness, Dr. George H. Fancher, states

enjoys an excellent reputation. At page 353 petroleum is defined:

> "Petroleum (earth oil, lima oil, naphtha, crude oil). Colour and properties: A thick, heavy, inflammable liquid, varying in colour from yellow to dark reddish-brown or black according to its place of origin. It has a peculiar distinct heavy odor also varying with its place of origin and decomposition. It usually shows a distinct greenish fluorescence. Constants: Specific gravity 0.780 to 0.970."

> "Derivation: All petroleums are mixtures of hydrocarbons, as many as one hundred and fifty different hydrocarbons having been found in the different crude oils. The important constituents are benzine, gasoline, kerosene, (solar oil), paraffin, petroleum (vaseline) petroleum ether, ligroin, petrolene, heavy lubricating oils, etc."

Natural gas is defined at page 323:

> ".....a mixture of gaseous hydrocarbons, having a high calorific value, formed in the earth and usually accompanying petroleum, though sometimes found alone, and frequently confined under great pressure. The composition varies with the locality from which recovered. When it does not contain an appreciable amount of readily condensible gasoline it is known as dry natural gas. Wet natural gas contains readily condensible gasoline."

Reference is further made to the definitions of the American Gas Association as published:

> "Casinghead Gas (Wet Natural Gas): Unprocessed natural gas which is produced from a strata containing crude petroleum and/or condensate."

> "Dissolved Natural Gas: Natural gas in solution with crude oil in the reservoir."

> "Dry Natural Gas: Natural gas that is produced from a stratum that does not contain crude petroleum and/or condensate, or gas that has had those components removed."

"Hydrocarbon: A compound that contains only hydrogen and carbon. The simplest forms of hydrocarbon are gaseous but with increasing molecular weights they become liquid and finally solid."

"Natural Gas: Any gas of natural origin as produced from oil or gas wells and consisting primarily of hydrocarbons."

"Natural Gas Reserves: Gas in natural formation in wells, fields or pools."

"Petroleum: A complex mixture of various hydrocarbons existing as a liquid in the upper strata of the earth."

The authoritative nature of the above definitions were not challenged throughout the trial. Indeed, Mr. Helman, counsel for the Canadian Pacific Railway Company, admits in his written argument that the dictionaries referred to at the trial all have what he terms "the narrow usage". I assume that if there were any contrary definitions I would have been referred to them, either in the course of the somewhat lengthy trial or in the written arguments submitted.

The defendants pressed upon me that I should accept certain definitions appearing in a few only of the encyclopedias and mostly in articles written by petroleum engineers and in other publications by petroleum engineers. Counsel for the defendants sometimes referred to the definitions as "broad", sometimes as "generic" and sometimes as "technical". I cannot accede to such submissions.

It seems plain that no such definitions have ever received general acceptance, even amongst technical and scientific people and much less amongst the general public.

Further, the term petroleum is not a technical or scientific term. It is an ordinary English word having a wide general usage. The agreement of 1906 and the transfer of 1918 were documents between ordinary people using ordinary language - people unconnected with the petroleum business, and in the ordinary acceptation of the word and in the legal acceptation of the word the

same does not include natural gas.

The defence witness, Lewis, refers to numerous publications, largely American, in an effort to demonstrate that the word "petroleum" has had and now has two parallel usages:

(a) A definition (which he calls a narrow definition) which fitted the original meaning of rock oil or mineral oil;

(b) A (generic) meaning which includes all hydrocarbons, solid and liquid and gaseous.

The witness states at page 43 of his brief, which incidentally was a brief headed "Report to Imperial Oil Limited",

> "In my testimony, I have endeavoured to show why two usages of the word 'petroleum' arose before 1906 and why the two usages have continued. I have endeavoured to show why there has been a need by those concerned with the production, origin and chemistry of oil and gas, particularly those of some technical understanding, for a generic word that would include all the naturally occurring hydrocarbons of common origin, whether they were observed in their gaseous, liquid or solid states, and that the state in which the hydrocarbon was observed was a matter of physical environment only."

I have grave doubts that those concerned with the production, origin and chemistry of oil and gas, and even those of technical understanding, use the word "petroleum" as extensively as the witness would lead me to believe, because it is quite clear from my listening to the experts called by the defence in the case at bar and the literature referred to, that the natural language to describe the substances in the earth when found in association one with another, including crude oil and natural gas, is the term "reservoir fluid". Further, the said experts in their briefs and testimony used the terminology "petroleum gases and natural petroleum gas". Such expressions were, I suspect, phrases largely used for the purposes of this litigation.

In any event, I accept the evidence of the witness, Dr. Nauss, his evidence being in complete harmony with the ordinary, the technical and the chemical dictionaries put in evidence. Dr. Nauss states that there is no clear difference between petroleum in the technical sense and the popular understanding of the word, and that natural gas is not a part of petroleum. Further, if there be the "broad" or "generic" or "technical" meaning of the word petroleum, as suggested by the defendants, and I do not accept this, I think it plain the parties never intended to use the word petroleum in that "broad" or "technical" or "generic" sense, and I am strongly of the view, which cannot be over-emphasized, that the present case should not turn on any technical, chemical or scientific signification of the term but rather on the meaning of "petroleum" and "natural gas" at all relevant times as used by ordinary persons concerned with the subject and especially as to the meaning understood and accepted by the parties.

Further, it is to be remembered that the draftsman of the Agreement for Sale in favour of Simon Borys and the transfer to him was the defendant Canadian Pacific Railway Company. It is for the transferor to make plain how much of the interior is taken out of the transfer by reservation. The language of a Scottish judge is accepted by the House of Lords, that an exception is to be construed strictly and not extended beyond what the words of exception clearly cover: North British R.W. Co. v. Budhill Coal and Sandstone Company, (1910) A.C. 116, at page 126.

The experts called by the defendants impressed on me such things as:

(a) The conflicts in interest that can arise under separate ownership of oil and gas;

(b) The impossibility of recovering the crude oil without the oil operator being allowed to use the natural gas;

while at the same time admitting that there were thousands of cases of divided ownership in the United States of America.

Suffice to say that such advocacy can hardly affect the question of construction here.

It may not be amiss to repeat what was said in another case where owners of respective properties were at variance.

> "The parties may find it to be to their mutual advantage to come to terms upon some fair workable system; remembering a suggestion that in a case of conflicting interests it is better to have a modus vivendi than to be in a continual attitude of qui vive!" (See Conigas Mines Limited v. Town of Cobalt (1909) 20 O.L.R., 622 at page 632.)

During the trial there was considerable discussion about the origin of crude oil and natural gas. The witness, Dr. Arthur Nauss, whose evidence impressed me throughout the trial, in cross-examination had this to say:

Q And is it not a fact that the origin of crude oil and natural gas is the same?

A That would be an incomplete statement of it. There is a lot - there are many cases where natural gas and crude oil come from the same source material, or we believe it comes from the same source material.

Q Yes.

A There are also many other cases where only natural gas came from the source material, and that is the reason that you will get a natural gas field without any oil associated with it.

Q But when we are talking about oil and talking about gas, we are talking about two substances which have a common origin?

A No, except in the zone of overlapping origin.

Q What do you mean by that?

A Natural gas will form independent of oil.

Q Yes? You mean, you may have natural gas without oil?

A Yes, that is right, or it may form without oil, you see.

Q Quite so, but that does not mean that their origins are not common, does it?

A Well, I would say it this way, that frequently it does have a common origin.

Q Yes?

A And frequently it does not.

In the exhibit, "Gas Reserves of Alberta" (Exhibit 31) we find some fifty-five fields in the Province of Alberta, containing natural gas.

It is noted that the ratio of fields producing dry natural gas in the Province of Alberta when compared to those producing wet natural gas is approximately five to one. The variety of formations from which natural gas is produced is noted, and as the witness, Dr. Nauss, pointed out, natural gas is found in this Province at depths underground ranging from 800 to 12,000 feet.

The witness, Lewis, pointed out that there are many different opinions, many different views as to the origin of oil. Much of the older literature to which I was referred postulates a theory that natural gas was the substance first formed and that later crude oil was condensed from the natural gas through the medium of porous rocks.

The evidence is inconclusive and disputatious as to origin of mineral oil and natural gas, and as I view the evidence while the two substances may have a similar origin, in the sense of being derived from animal or vegetable matter, it is by no means a common origin - and the number and extent of natural gas fields in this Province, occurring without mineral oil, is most impressive and cannot, I think, be accounted for by a common origin theory.

Turning now to the Leduc-Woodbend field in which the lands in question are located, it was proved that natural gas is found free of mineral oil;

1. In the Viking sand at a depth of some 1200 feet;

2. In the basal quartz sand at a depth of some 2000 feet;

3. In the D-1 formation between 2000 and 2500 feet;

4. In the D-3 formation at a depth of some 3000 feet where there is a large gas-cap.

Further, gas is found in solution with the mineral oil in the D-2 formation, and in the D-3 formation

where it underlies the gas-cap. The gas is held in solution with the mineral oil in the reservoir by the extreme pressure, the pressure in Leduc in the D-3 formation approximating 1900 pounds per square inch. The gas, of course, escapes from solution as the pressure declines toward atmospheric pressure of 14.4 pounds per square inch.

Both the free gas and the gas in solution are regarded as natural gas in computing natural gas reserves in the ground. Likewise, in calculating the petroleum reserves in the ground, the gas in solution is not taken into consideration and a correction is made so as to subtract from the fluid in the ground a certain volume in order to arrive at the petroleum reserves.

Dr. Nauss described the Leduc field as an oil and gas field. He estimated some 3 billion feet of natural gas within, upon or under the plaintiff's quarter section of land.

The estimate may be high or low, but I suspect low, because while Dr. Nauss considered the gas-cap underlying the plaintiff's land to be a small one, I observe from Exhibit 97 the defendant Imperial Oil Limited shows free gas above the oil in the Leduc D-3 producing area to cover the whole of the plaintiff's quarter section.

Dr. Nauss conceded that while at the moment the crude oil produced has a greater economic value than the gas at existing prices, if one takes into consideration the value of the gas as a lifting agent for the oil which would otherwise have to be pumped, the natural gas would have a good chance of being economically as important as the oil.

If the defendants or either of them be permitted to produce the plaintiff's natural gas, then I am convinced that the plaintiff's ownership of the natural gas will be virtually destroyed. As the defendants' witness, Lewis, said when confronted with evidence given by him at an export hearing to export natural gas from the Province of Alberta in the month of June, 1950, stated:

> Q I find amongst one of your reports, too, dealing with natural gas reserves - by the way, one of the things you did was to

calculate the amount of natural gas in place in various fields?

A Yes.

Q And by "in place" we mean underground?

A That is right.

Q And we include in that gas in solution in the liquid?

A Yes.

Q Now, I observe in one of your reports in estimating the amount of gas to be available from Leduc, and you say that you have assumed an increase in gas/oil ratio of two to one over the next ten years, therefore you have considered the available gas to remain constant. And you say that it is believed to be conservative since it is entirely possible for the gas/oil ratio to increase to three or four to one. Now, I want to ask you - now, I just want to ask you, you are talking about the gas/oil ratio, and talking about it increasing as much as three or four to one, do I take that to mean that if we now have 800 cubic feet of gas in a barrel of oil that there is a possibility of that increasing to say 2400 to 2500 cubic feet per barrel?

A Yes, I think so.

Q All right, and I will go over it shortly. And then you said that it is generally considered that it will not be available for 20 or 25 years or more, and that actually the gas-cap will be produced to some extent as will be evidenced by increasing gas/oil ratios. And then you go on to say to the effect that the gas-cap may never be opened to straight gas production, and that all of the gas in the gas-cap may be produced through the oil wells and that this might take place to a considerable degree over the next 30 years. Now, sir, that was the opinion of your firm?

A That is right.

Q And held by you?

A Yes.

Reference may conveniently be made to Fuller v. Garneau, 61 S.C.R. 450. That case lays down that a reservation in a Crown grant of "all mines and minerals

"which may be found to exist within, upon or under such lands together with the full power to work the same and for this purpose to enter upon and use and occupy the said lands or so much thereof to such an extent as may be necessary for the effectual working of the said minerals or the mines, pits, seams, and veins containing the same" reserves wider rights than a simple reservation in an agreement for sale of "all mines and minerals." Under the latter, there is no right to work in such a way as to let down surface while under the former there is implied a right to let down the surface if it is established that the mines cannot be worked or the minerals extracted without entailing such consequences.

The English case of Hext v. Gill, L.R. 7 Ch. Ap., page 699, goes somewhat further because while the Court there held that a valuable bed of china clay was a mineral and included in a reservation of mines and minerals, the Court none the less granted an injunction at the suit of the surface owner to restrain the owner of the minerals from getting at the china clay in such a way as to destroy or seriously injure the surface, and that when a land owner sells the surface reserving to himself the minerals with full power to get them, he must, if he intends to have power to get them in a way which will destroy the surface, frame the reservation in such a way as to show clearly that he intended to have that power.

It is noted that the Lord of the Manor reserved "all mines and minerals within and under the premises with full and free liberty of ingress, egress and regress, to dig and search for and take, use and work the excepted mines and minerals", but the deed contained no provision for compensation. In my opinion, destruction of the plaintiff's estate in the natural gas may be likened to the destruction of the surface estate referred to in the foregoing authorities. In the Barnard-Argue case, to which I have referred, the reservation was "excepting and reserving to the said company (The Canada Company) their successors and assigns, all mines and quarries of metals and minerals and all springs of oil in or under the said land, whether already discovered or not, with liberty of ingress, egress and regress to and for the said company, their successors, lessees, licensees and assigns in order to search for, work, win and carry away the same and for these purposes to make and use all needful

roads and other works, doing no other unnecessary damage and making reasonable compensation for all damage actually occasioned."

In the present case, there was no super-added power to win, work and carry away such as appears in many of the Canadian Pacific Railway Company reservations referred to in the evidence.

My conclusion is, and I find as a fact, that there is a valid reservation of petroleum, i.e., mineral oil, within, upon or under the said lands, but there is no reservation of natural gas, whether dry or wet, or held in solution with the mineral oil, and the same is the property of the plaintiff.

The defendants have no right to possess and enjoy the petroleum at the expense of the plaintiff and by using, without the plaintiff's agreement, the plaintiff's natural gas.

It is a difficult matter to find now the viva voce evidence of persons whose memory goes back to the year 1906, but as Lord Lorburn, L., stated in the case of Caledonian Railway Company v. Glenboig Union Fire Clay Company, (1910) A.C. 290 at page 299:

> "My Lords, the evidence given as to the common meaning is evidence given of the common meaning at the present day; I should assume that it was the same at the time of sale unless sufficient ground was given for coming to a contrary conclusion."

It makes little difference whether we take the meaning of petroleum in 1906; in 1918; in 1947 - or today. The meaning of petroleum in the Province of Alberta today and in the Dominion of Canada today is in complete harmony with the dictionary definitions and means the same as it has in the past, namely, mineral oil, and does not include natural gas, the two having been regarded as separate and distinct products; although they are chemical relatives, so to speak, in that each are hydrocarbons, they are none the less distinct and different products. That, in my opinion, is under all the circumstances, the fair and reasonable interpretation to place upon the language in question.

Counsel before me were unable to agree as to the principles deducible from the case of Barnard-Argue-Roth-Stearns Oil and Gas Company Limited v. Alexander Farquharson, reported in 1910, 22 O.L.R. 319 (Trial), 1911, 25 O.L.R. 93 (Ontario Court of Appeal) and 1912 A.C. 864 (in the Privy Council). The defendants claim that the judgment of the Privy Council is faulty in the light of present scientific knowledge and "perhaps even were faulty from this point of view when the Judgment was delivered in 1912". Further, the defendants rely on certain selected passages from the trial Judgment of Chancellor Boyd in which the learned trial Judge makes reference to the words "petroleum" and "petroleum beds". Further, the defendants rely on the dissenting judgment of Meredith, J.A., in the Court of Appeal.

I regard the use of the words "petroleum" and "petroleum beds" by Chancellor Boyd as obiter, and further, it is to be remembered that the said trial Judge did not have the advantage of either evidence or argument before him as to the true meaning of the said words, the question in issue before him largely relating to the meaning of the words "springs of oil".

Much more guidance is obtainable from the judgment of the Privy Council. The Privy Council was dealing with a case of a flowing well which, as I appreciate the evidence, means gas in solution, and they were certainly dealing with a case where oil and natural gas in some cases impregnated the same subterranean porous stratum and a stratum which when tapped by a pipe or boring leading to the surface, the gas in its escape to the upper air helped to bring up to the surface with it some of the oil.

The Privy Council stated at page 869:

> "In one sense natural gas is, as rock oil also is, a mineral....."

At page 870 the Privy Council stated:

> "At the date of this deed, January 22nd, 1867, the winning of mineral oil through wells was a comparatively new industry."

The terms "rock oil" and "mineral oil" as used by the Privy Council have, in my opinion, the same meaning as the word "petroleum" and no valid distinction has been made between the case at bar and the Barnard-Argue case.

It is true that an attempt was made through the witness, Katz, to show that the scientific testimony given today is not in accord with the scientific views held at the time the Barnard-Argue case was decided. I do not know, nor was it in any way explained, why the witness, Katz, says the gas in question is volatilized rock oil if indeed he meant so to state, nor do I know what the witness means by his statement that the gas in question is an exhalation of the oil, if indeed he meant so to swear.

From the evidence it is clear that natural gas is not derived from mineral oil. Needless to say that on hearing the evidence adduced in this case, I am unable to accept the evidence apparently given by the late Eugene Coste in the Farquharson case relative to the meaning of petroleum, as being the proper view, either in Eugene Coste's time or in the present day.

Counsel for the Canadian Pacific Railway Company, in his written argument, states: "Seldom in any law suit has there been such an array of the world's greatest living scientists to give evidence on this problem." I have already stated my impression of the defence witnesses and I only desire to add that the plaintiff's witnesses and particularly, Nauss, Slipper, Harvie and Garrett, impressed me throughout as men of competence, impartiality and possessed of vast knowledge of petroleum and natural gas generally and an intimate experience with the Alberta situation.

There will, therefore, be judgment declaring that the plaintiff is the owner of the natural gas within, upon or under the said lands and the interlocutory injunction granted by this Court on the 1st day of March, A.D. 1950, will be made permanent.

The counterclaims advanced by the defendants and each of them are dismissed with costs.

The case is of sufficient importance to justify the taxation of costs to whichever party may ultimately

succeed under double column 5 including a second counsel fee and examinations for discovery, Rule 738 not to apply, and the plaintiff's costs will be taxed accordingly.

DATED at the Court House, in the City of Edmonton, in the Province of Alberta, this 9th day of May, A.D. 1951.

10 "W. R. HOWSON"

C.J. T.D. S.C.A.

JUDGMENT ROLL.

IN THE TRIAL DIVISION OF THE SUPREME
COURT OF ALBERTA
JUDICIAL DISTRICT OF CALGARY

At the Court House, City of Calgary, Province of Alberta, the 9th day of May, A.D. 1951.

PRESENT:

The Honourable Chief Justice W. R. Howson.

BETWEEN:

MICHEAL BORYS,

Plaintiff

- and -

CANADIAN PACIFIC RAILWAY COMPANY
- and -
IMPERIAL OIL LIMITED,

Defendants.

JUDGMENT ROLL

This action having come on for trial at a special civil non jury sittings of this Honourable Court commencing Thursday, the 16th day of November, A.D. 1950, before the Honourable Chief Justice W. R. Howson, without a jury, and continued thereafter on the following days, that is to say, November 16th, 17th, 20th, 21st, 22nd, 23rd and 24th, A.D. 1950, and upon hearing the evidence adduced by the parties hereto, and upon hearing Counsel on behalf of the said respective parties, this Court was pleased to direct this action should stand over for judgment and upon the same coming on this day for judgment:

THIS COURT DOTH ORDER AND ADJUDGE:

1. That the Plaintiff is hereby declared to be and is the owner of natural gas: whether dry, or wet, or held in solution with the mineral oil, in, upon or under the lands as follows, that is to say: the North East

Quarter of Section 19, in Township 50, of Range 26, West of the 4th Meridian, in the Province of Alberta;

2. That the interlocutory injunction granted by this Honourable Court on the 1st day of March, A.D. 1950, be and the same is hereby made permanent;

3. That the Counterclaim advanced by the Defendants and each of them be and the same are hereby dismissed with costs;

4. That the Plaintiff do recover from the Defendants his costs of the action and costs of the Counterclaim herein pursuant to double column 5 of the Consolidated Rules of Court, second counsel fee to be taxed, Rule 738 not to apply.

"W. K. JULL"

Clerk of the Court.

LET THIS JUDGMENT BE ENTERED:

"W. R. HOWSON"

C.J. S.C.

Entered this 26th day of June, 1951,

W. K. JULL "H"
Clerk of the Supreme Court

(SEAL)

IN THE TRIAL DIVISION OF THE
SUPREME COURT OF ALBERTA
JUDICIAL DISTRICT OF CALGARY

BETWEEN:

MICHEAL BORYS,

Plaintiff

- and -

CANADIAN PACIFIC RAILWAY COMPANY
and IMPERIAL OIL LIMITED,

Defendants.

NOTICE OF APPEAL

TAKE NOTICE that the Defendant Canadian Pacific Railway Company herein intends to appeal and does hereby appeal from the whole of the Judgment herein delivered by the Honourable Chief Justice W. R. Howson on the 9th day of May, A.D. 1951, and entered on the 26th day of June, A.D. 1951, to the Appellate Division of the Supreme Court of Alberta on the following, amongst other grounds:

1. The learned Trial Judge's finding of fact, reasons for Judgment and Judgment are contrary to the law, evidence and weight of evidence relative thereto.

2. The learned Trial Judge should have held that in the reservation "Reserving unto the Canadian Pacific Railway Company all coal, petroleum and valuable stone" the word "petroleum" was used in its broad, generic and technical sense and that coupled with the word "all" it would include gas whether dry or wet or held in solution.

3. The learned Trial Judge erred in coming to the conclusion that the Defendant Canadian Pacific Railway Company at all material times regarded petroleum as the equivalent of mineral oil and natural gas as a distinct and different product or substance or mineral not included within the meaning of the word "petroleum".

4. The learned Trial Judge erred in holding that in the year 1906 in the Province of Alberta natural gas

was not regarded as a substance of commercial value and even at a later date regarded as a dangerous nuisance.

5. The learned Trial Judge should have held that the useful function performed by natural gas in the production of petroleum in its liquid phase was well known in the year 1906.

6. The learned Trial Judge erred in holding that there was a deliberate omission on the part of the Defendant Canadian Pacific Railway Company to specify natural gas by the use of apt words in the reservation contained in the Contract and Transfer issued pursuant thereto covering the land in question, and should have held that the words "all petroleum" as contained in the said reservation having regard to the context and the evidence submitted embraced and included natural gas.

7. The learned Trial Judge erred in not giving effect to the word "all" as used with the word "petroleum".

8. The learned Trial Judge erred in finding that the major question for decision was: Having regard to the time at which the documents between the parties were executed and the facts and circumstances then existing, what did the parties to the documents intend to express by the language which they have used, or in other words, what was their intention touching the substances to be excepted as revealed by that language?

9. The learned Trial Judge erred in not holding that this Defendant has the right, in any event, without any compensation to the Plaintiff to use the natural gas or any other substance necessary to obtain the petroleum in its liquid phase.

10. That the learned Trial Judge erred in finding that even if the word "petroleum" does not include natural gas that the Defendants have no right to work, win or carry away the natural gas occurring in the same reservoir with the petroleum in its liquid phase.

11. That the learned Trial Judge erred in finding that even if the word "petroleum" does not include natural gas that the Defendants have no right to work, win and carry away the natural gas contained in solution in the petroleum in its liquid phase.

12. That the learned Trial Judge erred in finding that even if the word "petroleum" does not include natural gas the Defendants have not the right to remove, appropriate, convert, use and dispose of such natural gas as may be necessary or incidental to work, win or carry away the petroleum in its liquid phase.

13. The learned Trial Judge erred in not holding that this Defendant is entitled, in any event, to control the well and the natural gas produced therefrom so as to obtain the maximum oil recovery.

14. The learned Trial Judge erred in not holding there was no vernacular usage of the word "petroleum" in the Leduc district in 1906.

15. The learned Trial Judge erred in not holding that in the vernacular petroleum includes oil and natural gas.

16. The learned Trial Judge erred in not holding that there are two uses of the word "petroleum" and that having regard to the context and the surrounding circumstances it was used in this reservation so as to include natural gas.

17. The learned Trial Judge erred in not giving consideration to the various authorities produced by the witnesses for the Defendants as to the usage of the word "petroleum".

18. The learned Trial Judge erred in not holding that, in any event, this Defendant is entitled to all the liquid or liquifiable products obtained by separation, compression, refrigeration or other process and to the fullest use (without compensation to the Plaintiff) of the natural gas for such purpose together with the use and consumption of such natural gas as may be necessary in such operations.

19. The learned Trial Judge erred in not holding that the word "petroleum" when used by persons dealing with same as a commercial product at the surface has a different meaning from the use of such word when referring to the same in the reservoir, and that in the latter sense the same includes natural gas.

20. The learned Trial Judge erred in not holding that it was necessary to ascertain the exact scientific content of the substance "all petroleum" and that such substance could not vary from title to title having regard to the scheme and provisions of the Alberta Land Titles Act.

21. The learned Trial Judge erred in not giving due weight to the evidence given by the witnesses for the Defendants most of which was uncontradicted.

22. The learned Trial Judge erred in holding that at the time the agreement was entered into and carried out by the transfer of 1918 mineral oil was the primary and indeed the sole object of the reservation.

23. The learned Trial Judge erred in holding that it has been proved that the word "petroleum" in common parlance or in the vernacular of the mining world, the commercial world and land owners or in the popular sense or in the language of plain men does not include natural gas but is the equivalent of crude oil.

24. The learned Trial Judge erred in holding that he was to consider the usage of the word "petroleum" in common parlance or in the popular sense or in the language of plain men.

25. The learned Trial Judge erred in holding that natural gas is regarded as a distinct and different product from petroleum and in particular the learned Trial Judge erred in holding that any other construction is entirely opposed to the spirit of the system of reservations and proprietorship of land in the Province of Alberta.

26. The learned Trial Judge erred in holding that he was not referred to any definitions which held petroleum included natural gas.

27. The learned Trial Judge erred in holding that in technical dictionaries petroleum was not defined to include natural gas and erred in relying on dictionaries and chemical dictionaries dealing with liquid petroleum at the surface and not with petroleum in the reservoir.

28. The learned Trial Judge erred in holding that there is no "broad", "generic", or "technical" meaning of the term "petroleum".

29. The learned Trial Judge erred in not accepting the broad generic or technical definition of petroleum and in particular the learned Trial Judge erred in holding that such definitions never received general acceptance amongst technical and scientific people.

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30. The learned Trial Judge erred in holding that petroleum may not be a technical or scientific term but is necessarily an ordinary English word having a wide general usage and in not relating the meaning to the context.

31. The learned Trial Judge erred in holding that there is no clear difference between the petroleum in the technical sense and the popular understanding of the
20 word and that natural gas is not a part of petroleum.

32. The learned Trial Judge erred in holding that the parties never intended to use the word "petroleum" in the broad technical or generic sense.

33. The learned Trial Judge erred in holding that oil and natural gas have not a common origin.

34. The learned Trial Judge erred in holding that
30 there was no reservation of natural gas whether dry or wet or held in solution with the mineral oil and erred in holding the same is the property of the Plaintiff.

35. The learned Trial Judge erred in holding that the meaning of "petroleum" in a reservation in the Province of Alberta today is in complete harmony with dictionary definitions and means the same as it has in the past, namely: mineral oil, and does not include natural gas, the two having been regarded as separate
40 and distinct products.

36. The learned Trial Judge erred in holding that the terms "rock oil" and "mineral oil" as used by the Privy Council have the same meaning as the word "petroleum" and in particular the learned Trial Judge erred in holding that there was no valid distinction made between the case at Bar and Farquharson v. Barnard-Argue-Roth-Stearns Oil

& Gas Company (1912) A.C. 864.

37. The learned Trial Judge erred in not accepting the evidence of the late Eugene Coste given in the Barnard-Argue case relative to the meaning of petroleum as being the meaning of petroleum either in Eugene Coste's time or in the present day.

38. The learned Trial Judge erred in holding that natural gas is not derived from mineral oil.

39. The learned Trial Judge erred in permitting the Plaintiff to call more than three witnesses to give opinion evidence contrary to the provision of Section 10 of the Alberta Evidence Act.

40. The learned Trial Judge erred in holding that because the expression "reservoir fluid" is used (which expression also includes water and other substances) that the expression "petroleum" does not properly describe that part of the reservoir fluid which consists of oil and natural gas.

41. The learned Trial Judge erred in his suspicion that the phrase "petroleum gases and natural petroleum gases" were largely used for the purposes of this litigation.

42. The learned Trial Judge erred in holding that there was any burden on this Defendant to make plain how much of the interior is taken out of the transfer by reservation or if any such burden exists that this Defendant has not satisfied the same.

43. The learned Trial Judge misconstrued the effect of the evidence for the Defendants with respect to the impossibility of recovering oil without natural gas, the same being introduced not as a matter of "advocacy" but to show the intention of the parties when the reservation was made.

44. The learned Trial Judge erred in finding that in the Leduc-Woodbend field natural gas is found free of mineral oil.

45. The learned Trial Judge should have held that the Plaintiff is not in law possessed of such ownership

of the natural gas as to enable it to maintain this action.

46. The learned Trial Judge failed to give effect to the rights granted to the Defendants pursuant to the provisions of the Right of Entry Arbitration Act, being Chapter 44 of the Statutes of Alberta, 1947.

47. The learned Trial Judge erred in permitting the witness Gustafson to be cross-examined on matters requiring him to give expert opinion evidence, the said witness having been called to give only evidence as to facts.

48. The learned Trial Judge erred in permitting the Plaintiff to put in evidence the questions and answers on discovery which had been held inadmissible by the Appellate Division.

49. The learned Trial Judge erred in finding that the witness, Henry Vincent O'Connor, was not a witness giving opinion evidence.

50. The learned Trial Judge erred in admitting as evidence of the intention of the parties documents other than the agreement for sale, transfers and titles affecting the lands, the subject matter of this action, and the mines and minerals thereunder.

51. The learned Trial Judge erred in holding that this case was not governed by the ordinary rules of evidence and thereby permitted inadmissible evidence to be introduced by the Plaintiff.

52. The learned Trial Judge erred in admitting the verbal testimony of Simon Borys as to his understanding of the agreement between him and this Defendant.

53. The learned Trial Judge erred in permitting witnesses to interpret the words which are the subject matter of this action.

54. The learned Trial Judge erred in making the interlocutory injunction granted in this action permanent and should have set the same aside and directed a reference to determine the damages sustained by the Defendants as a result of the interim injunction.

55. And upon such further and other grounds as may appear from the pleadings and evidence herein.

AND FURTHER TAKE NOTICE that the said Defendant, Canadian Pacific Railway Company, will move that the said Judgment of the Honourable Chief Justice W.R. Howson, entered on the 26th day of June, A.D. 1951, be set aside and that this Appeal be allowed with costs, and the action dismissed with costs and the Counterclaim of the Defendant Canadian Pacific Railway Company be allowed or in the alternative that a new trial be granted, the costs of the first trial to be paid by the Plaintiff.

DATED at the City of Calgary, in the Province of Alberta, this 31st day of August, A.D. 1951.

"R. R. MITCHELL"

R. R. Mitchell
Solicitor for the Defendant
Canadian Pacific Railway Company

TO:

Micheal Borys,
Plaintiff.

AND TO:

Messrs. Fisher, McDonald & Fisher,
Solicitors for the Plaintiff,

AND TO:

The Clerk of the Court,
Calgary, Alberta.

IN THE TRIAL DIVISION OF THE
SUPREME COURT OF ALBERTA
JUDICIAL DISTRICT OF CALGARY

BETWEEN:

MICHEAL BORYS,

Plaintiff

- and -

CANADIAN PACIFIC RAILWAY COMPANY
and IMPERIAL OIL LIMITED,

Defendants.

NOTICE OF APPEAL

TAKE NOTICE that the Defendant, Imperial Oil Limited, herein intends to appeal and does hereby appeal from the whole of the Judgment herein delivered by the Honourable Chief Justice W. R. Howson on the 9th day of May, A.D. 1951, and entered on the 26th day of June, A.D. 1951, to the Appellate Division of the Supreme Court of Alberta on the following, amongst other grounds:

1. The learned Trial Judge's finding of fact, reasons for Judgment and Judgment are contrary to the law, evidence and weight of evidence relative thereto.

2. The learned Trial Judge should have held that in the reservation, "Reserving unto the Canadian Pacific Railway Company all coal, petroleum and valuable stone", the word, "petroleum" was used in its broad, generic and technical sense and that coupled with the word "all", it would include natural gas whether dry or wet or held in solution.

3. The learned Trial Judge erred in coming to the conclusion that the Defendant Canadian Pacific Railway Company at all material times regarded petroleum as the equivalent of mineral oil and natural gas as a distinct and different product or substance or mineral not included within the meaning of the word "petroleum".

4. The learned Trial Judge erred in holding that in the year 1906 in the Province of Alberta natural gas was not regarded as a substance of commercial value and even at a later date regarded as a dangerous nuisance.

5. The learned Trial Judge should have held that the useful function performed by natural gas in the production of petroleum in its liquid phase was well known in the year 1906.

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6. The learned Trial Judge erred in holding that there was a deliberate omission on the part of the Defendant Canadian Pacific Railway Company to specify natural gas by the use of apt words in the reservation contained in the Contract and Transfer issued pursuant thereto covering the land in question, and should have held that the words "all petroleum" as contained in the said reservation having regard to the context and the evidence submitted embraced and included natural gas.

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7. The learned Trial Judge erred in not giving effect to the word "all" as used with the word "petroleum".

8. The learned Trial Judge erred in finding that the major question for decision was: Having regard to the time at which the documents between the parties were executed and the facts and circumstances then existing, what did the parties to the documents intend to express by the language which they have used, or in other words,
30 what was their intention touching the substances to be excepted as revealed by that language?

9. The learned Trial Judge erred in not holding that this Defendant has the right, in any event, without any compensation to the Plaintiff, to use the natural gas or any other substance necessary to obtain the petroleum in its liquid phase.

10. That the learned Trial Judge erred in finding
40 that even if the word "petroleum" does not include natural gas that the Defendants have no right to work, win or carry away the natural gas occurring in the same reservoir with the petroleum in its liquid phase.

11. That the learned Trial Judge erred in finding that even if the word "petroleum" does not include natural gas that the Defendants have no right to work,

win or carry away the natural gas contained in solution in the petroleum in its liquid phase.

12. That the learned Trial Judge erred in finding that even if the word "petroleum" does not include natural gas the Defendants have not the right to remove, appropriate, convert, use and dispose of such natural gas as may be necessary or incidental to work, win or carry away the petroleum in its liquid phase.

13. The learned Trial Judge erred in not holding that this Defendant is entitled, in any event, to control the well and the natural gas produced therefrom so as to obtain the maximum oil recovery.

14. The learned Trial Judge erred in not holding there was no vernacular usage of the word "petroleum" in the Leduc district in 1906.

15. The learned Trial Judge erred in not holding that in the vernacular petroleum includes oil and natural gas.

16. The learned Trial Judge erred in not holding that there are two uses of the word "petroleum" and that having regard to the context and the surrounding circumstances it was used in this reservation so as to include natural gas.

17. The learned Trial Judge erred in not giving consideration to the various authorities produced by the witnesses for the Defendants as to the usage of the word "petroleum".

18. The learned Trial Judge erred in not holding that, in any event, this Defendant is entitled to all the liquid or liquifiable products obtained by separation, compression, refrigeration or other process and to the fullest use (without compensation to the Plaintiff) of the natural gas for such purpose together with the use and consumption of such natural gas as may be necessary in such operations.

19. The learned Trial Judge erred in not holding that the word "petroleum" when used by persons dealing with same as a commercial product at the surface has a different meaning from the use of such word when referring

to the same in the reservoir, and that in the latter sense the same includes natural gas.

20. The learned Trial Judge erred in not holding that it was necessary to ascertain the exact scientific content of the substance "all petroleum" and that such substance could not vary from title to title having regard to the scheme and provisions of the Alberta Land Titles Act.

21. The learned Trial Judge erred in not giving the weight to the evidence given by the witnesses for the Defendants most of which was uncontradicted.

22. The learned Trial Judge erred in holding that at the time the agreement was entered into and carried out by the transfer of 1918 mineral oil was the primary and indeed the sole object of the reservation.

23. The learned Trial Judge erred in holding that it has been proved that the word "petroleum" in common parlance or in the vernacular of the mining world, the commercial world and land owners or in the popular sense or in the language of plain men does not include natural gas but is the equivalent of crude oil.

24. The learned Trial Judge erred in holding that he was to consider the usage of the word "petroleum" in common parlance or in the popular sense or in the language of plain men.

25. The learned Trial Judge erred in holding that natural gas is regarded as a distinct and different product from petroleum and in particular the learned Trial Judge erred in holding that any other construction is entirely opposed to the spirit of the system of reservations and proprietorship of land in the Province of Alberta.

26. The learned Trial Judge erred in holding that he was not referred to any definitions which held petroleum included natural gas.

27. The learned Trial Judge erred in holding that in technical dictionaries petroleum was not defined to include natural gas and erred in relying on dictionaries and chemical dictionaries dealing with liquid petroleum

at the surface and not with petroleum in the reservoir.

28. The learned Trial Judge erred in holding that there is no "broad", "generic" or "technical" meaning of the term "petroleum".

29. The learned Trial Judge erred in not accepting the broad generic or technical definition of petroleum and in particular the learned Trial Judge erred in holding that such definitions never received general acceptance amongst technical and scientific people.

30. The learned Trial Judge erred in holding that petroleum may not be a technical or scientific term but is necessarily an ordinary English word having a wide general usage and in not relating the meaning to the context.

31. The learned Trial Judge erred in holding that there is no clear difference between the petroleum in the technical sense and the popular understanding of the word and that natural gas is not a part of petroleum.

32. The learned Trial Judge erred in holding that the parties never intended to use the word "petroleum" in the broad technical or generic sense.

33. The learned Trial Judge erred in holding that oil and natural gas have not a common origin.

34. The learned Trial Judge erred in holding that there was no reservation of natural gas whether dry or wet or held in solution with the mineral oil and erred in holding the same is the property of the Plaintiff.

35. The learned Trial Judge erred in holding that the meaning of "petroleum" in a reservation in the Province of Alberta today is in complete harmony with dictionary definitions and means the same as it has in the past, namely: mineral oil, and does not include natural gas, the two having been regarded as separate and distinct products.

36. The learned Trial Judge erred in holding that the terms "rock oil" and "mineral oil" as used by the Privy Council have the same meaning as the word "petroleum", and in particular the learned Trial Judge

erred in holding that there was no valid distinction made between the case at Bar and Farquharson v. Barnard-Argue-Roth-Stearns Oil & Gas Company (1912) A.C. 864.

37. The learned Trial Judge erred in not accepting the evidence of the late Eugene Coste given in the Barnard-Argue case relative to the meaning of petroleum as being the meaning of petroleum either in Eugene Coste's time or in the present day.

38. The learned Trial Judge erred in holding that natural gas is not derived from mineral oil.

39. The learned Trial Judge erred in permitting the Plaintiff to call more than three witnesses to give opinion evidence contrary to the provision of Section 10 of the Alberta Evidence Act.

40. The Learned Trial Judge erred in holding that because the expression "reservoir fluid" is used (which expression also includes water and other substances) that the expression "petroleum" does not properly describe that part of the reservoir fluid which consists of oil and natural gas.

41. The learned Trial Judge erred in his suspicion that the phrase "petroleum gases and natural petroleum gases" were largely used for the purposes of this litigation.

42. The learned Trial Judge erred in holding that there was any burden on this Defendant to make plain how much of the interior is taken out of the transfer by reservation or if any such burden exists that this Defendant has not satisfied the same.

43. The learned Trial Judge misconstrued the effect of the evidence for the Defendants with respect to the impossibility of recovering oil without natural gas, the same being introduced not as a matter of "advocacy" but to show the intention of the parties when the reservation was made.

44. The learned Trial Judge erred in finding that in the Leduc-Woodbend field natural gas is found free of mineral oil.

45. The learned Trial Judge should have held that the Plaintiff is not in law possessed of such ownership to the natural gas as to enable it to maintain this action.

46. The learned Trial Judge failed to give effect to the rights granted to the Defendants pursuant to the provisions of the Right of Entry Arbitration Act, being Chapter 44 of the Statutes of Alberta, 1947.

47. The learned Trial Judge erred in permitting the witness Gustafson to be cross-examined on matters requiring him to give expert opinion evidence, the said witness having been called to give only evidence as to facts.

48. The learned Trial Judge erred in permitting the Plaintiff to put in evidence the questions and answers on Discovery which had been held inadmissible by the Appellate Division.

49. The learned Trial Judge erred in finding that the witness, Henry Vincent O'Connor, was not a witness giving opinion evidence.

50. The learned Trial Judge erred in admitting as evidence of the intention of the parties documents other than the agreement for sale, transfers and titles affecting the lands, the subject matter of this action, and the mines and minerals thereunder.

51. The learned Trial Judge erred in holding that this case was not governed by the ordinary rules of evidence and thereby permitted inadmissible evidence to be introduced by the Plaintiff.

52. The learned Trial Judge erred in admitting the verbal testimony of Simon Borys as to his understanding of the agreement between him and this Defendant.

53. The learned Trial Judge erred in permitting witnesses to interpret the words which are the subject of this action.

54. The learned Trial Judge erred in making the interlocutory injunction granted in this action permanent and should have set the same aside and directed a refer-

ence to determine the damages sustained by the Defendants as a result of the interim injunction.

55. And upon such further and other grounds as may appear from the pleadings and evidence herein.

AND FURTHER TAKE NOTICE that the said Defendant Imperial Oil Limited will move that the said Judgment of the Honourable Chief Justice W. R. Howson, entered on the 26th day of June, A.D. 1951, be set aside and that this Appeal be allowed with costs, and the action dismissed with costs and the Counterclaim of the Defendant Imperial Oil Limited be allowed or in the alternative that a new trial be granted, the costs of the first trial to be paid by the Plaintiff.

DATED at the City of Calgary, in the Province of Alberta, this 31st day of August, A.D. 1951.

NOLAN, CHAMBERS, MIGHT, SAUCIER & PEACOCK

Per: "H. G. NOLAN"

Solicitors for the Defendant Imperial Oil Limited.

TO:

Micheal Borys,
Plaintiff,

AND TO:

Messrs. Fisher, McDonald & Fisher,
Solicitors for the Plaintiff,

AND TO:

W. K. Jull, Esq., K.C.,
The Clerk of the Court,
Calgary, Alberta.

IN THE SUPREME COURT OF ALBERTA
(APPELLATE DIVISION)
JUDICIAL DISTRICT OF CALGARY

BETWEEN:

MICHEAL BORYS

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY,
- and -
IMPERIAL OIL LIMITED,

Defendants
(Appellants)

BEFORE:

The Honourable Mr. Justice W. A. Macdonald.

IN CHAMBERS.

DATED at the Court House, Calgary, Alberta, Saturday, the 29th day of September, A.D. 1951.

O R D E R

UPON THE APPLICATION of the Appellant Imperial Oil Limited and upon hearing read the affidavit of David E. Lewis filed and upon hearing what was alleged by Counsel on behalf of the Appellant Imperial Oil Limited,

IT IS ORDERED that the printing of the exhibits entered at the trial of this action and their inclusion in the Appeal Book filed herein be and the same are hereby dispensed with.

"W. A. MACDONALD"
J.S.C.

ENTERED at the Court House, Calgary, Alberta, this 29th day of 1951.

"W. K. JULL" BM (SEAL)
Registrar at Calgary.

CONSENTED TO:
"R. R. MITCHELL"
Solicitors for the Appellant Canadian Pacific Railway Co.

CONSENTED TO:
"D. RAY FISHER"
Solicitors for the Respondent Micheal Borys.

AGREEMENT AS TO CONTENTS OF APPEAL BOOK.

IN THE SUPREME COURT OF ALBERTA
(APPELLATE DIVISION)
JUDICIAL DISTRICT OF CALGARY

BETWEEN:

MICHEAL BORYS

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY
- and -
IMPERIAL OIL LIMITED,

Defendants
(Appellants)

AGREEMENT AS TO CONTENTS OF APPEAL BOOK

IT IS HEREBY AGREED by and between counsel for the Plaintiff Micheal Borys and the Defendant the Canadian Pacific Railway Company and the Defendant Imperial Oil Limited that the Appeal Book on the appeal herein from the Judgment of the Honourable Chief Justice W.R. Howson delivered on the 9th day of May, A.D. 1951, and entered on the 26th day of June, A.D. 1951, shall consist of the following:

1. Statement of Claim.

2. Statement of Defence of Canadian Pacific Railway Company.

3. Counterclaim of Canadian Pacific Railway Company.

4. Statement of Defence of Imperial Oil Limited.

5. Counterclaim of Imperial Oil Limited.

6. Joinder of Issue and Reply to the Defence of Canadian Pacific Railway Company.

7. Defence to Counterclaim of the Defendant Canadian Pacific Railway Company.

8. Joinder of Issue and Reply to the Defence of Imperial Oil Limited.

9. Defence to Counterclaim of Imperial Oil Limited.

10. Reply of Imperial Oil Limited to Defence to Counterclaim.

11. Reply of Canadian Pacific Railway Company to Defence to Counterclaim.

12. Evidence taken at trial.

13. Reasons for Judgment.

14. Formal Judgment.

15. Notice of Appeal.

16. Order of Mr. Justice W. A. Macdonald, dated the 29th day of September, A.D. 1951.

17. This Agreement.

18. Clerk's Certificate.

DATED at the City of Calgary, in the Province of Alberta, this 3rd day of October, A.D. 1951.

"R. R. MITCHELL"
Counsel for the Appellant Canadian Pacific Railway Company.

"H. G. NOLAN"
Counsel for the Appellant Imperial Oil Limited.

"D. RAE FISHER"
Counsel for the Respondent, Micheal Borys.

CLERK'S CERTIFICATE.

I, the undersigned Clerk of the Supreme Court of Alberta, in and for the Judicial District of Calgary, hereby certify to the Registrar of the said Court that the foregoing document is a true copy of the Statement of Claim; Statement of Defence of Canadian Pacific Railway Company; Counterclaim of Canadian Pacific Railway Company; Statement of Defence of Imperial Oil Limited; Counterclaim of Imperial Oil Limited; Joinder of Issue and Reply to the Defence of Canadian Pacific Railway Company; Defence to Counterclaim of the Defendant Canadian Pacific Railway Company; Joinder of Issue and Reply to the Defence of Imperial Oil Limited; Defence to Counterclaim of Imperial Oil Limited; Reply of Imperial Oil Limited to Defence to Counterclaim; Reply of Canadian Pacific Railway to Defence to Counterclaim; Evidence taken at Trial; Reasons for Judgment; Formal Judgment of the Honourable Chief Justice W. R. Howson dated the 26th day of June, A.D. 1951; Order of the Honourable Mr. Justice W. A. Macdonald dated the 29th day of September, A.D. 1951, and this Agreement.

THAT this Appeal Book has been approved by the Solicitors; that the Appellant filed the said Notice of Appeal on the 31st day of August, A.D. 1951.

DATED the day of October, A.D. 1951.

Clerk of the Supreme Court
J.D.C.

# O R D E R

BEFORE THE HONOURABLE ) Dated at Red Deer, Alberta,
CHIEF JUSTICE W.R. HOWSON ) Wednesday, the 1st day of
IN CHAMBERS: ) March, A.D. 1950.

UPON the Application of the Plaintiff, and UPON hearing read the material filed herein, and UPON hearing Counsel for the Plaintiff, and UPON hearing Counsel for the Defendant, and the plaintiff by his Counsel undertaking to abide by any order this Court may make as to damages in case this Court shall hereafter be of opinion that the defendant shall have sustained any by reason of this Order which the plaintiff ought to pay,

IT IS ORDERED that the Defendant, Imperial Oil Limited, its servants, agents, contractors, successors and any one on its behalf be restrained and enjoined and an injunction is hereby granted restraining it from using, removing, wasting, interfering, producing, or otherwise disposing in any manner whatever, of the natural gas, or any part thereof, within, upon or under the North East Quarter of Section (19), in Township (50), Range (26), West of the Fourth Meridian, in the Province of Alberta, until after the trial of this action or until further Order,

AND IT IS FURTHER ORDERED that the costs of this Application be costs in the cause.

"W. R. HOWSON"
C.J. S.C.

APPROVED as to form:

FISHER, McDONALD & FISHER,
per: "D. Rae Fisher"
Solicitors for the Plaintiff.

ENTERED this 2nd day
of March 1950
W. K. JULL "BM"
A/Clerk of Supreme Court.

(SEAL)

JUDGMENT OF THE HONOURABLE MR. JUSTICE H.H. PARLEE

IN THE SUPREME COURT OF ALBERTA
Appellate Division

BETWEEN:

MICHEAL BORYS,

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY
and IMPERIAL OIL LIMITED,

Defendants
(Appellants)

REASONS FOR JUDGMENT
of The Honourable Mr. Justice Parlee

The plaintiff is the registered owner of the North East Quarter of Section 19, Township 50, Range 26, West of the 4th Meridian, Alberta, containing 159 acres, more or less, "reserving unto the Canadian Pacific Railway Company all coal, petroleum and valuable stone".

The question for decision is the meaning and effect that should be given to the reservation of petroleum.

Shortly, the plaintiff claims that petroleum is a liquid as it exists in the earth and does not include gaseous hydrocarbons. The defendants, on the contrary, contend that petroleum embraces not only crude oil but includes all gaseous hydrocarbons whether liquid, solid or gaseous.

The plaintiff relies on the usage of the word petroleum and the defendants say that petroleum should be given its scientific meaning and is a generic and technical word. The above will serve as an introduction to the problems to be solved.

The learned Chief Justice of the Trial Division who presided at the trial found, and I will quote his words:

"My conclusion is and I find as a fact that there is a valid reservation of petroleum, i.e., mineral oil, within, upon or under the said lands, but there is no reservation of natural gas, whether dry, or wet, or held in solution with the mineral oil and the same is the property of the plaintiff."

"The Defendants have no right to possess and enjoy the petroleum at the expense of the plaintiff and by using, without the plaintiff's agreement, the plaintiff's natural gas."

His reasons are reported (1951) 2 W.W.R. 145.

The plaintiff was declared to be the owner of the natural gas within, upon or under the said lands and the interlocutory injunction granted by the Chief Justice on the 1st of March, 1950, which enjoined the defendants from "using, removing, wasting, interfering with, producing or otherwise disposing in any manner whatever of the natural gas or any part thereof within, upon or under" the said land, was made permanent. The defendants' counterclaims were dismissed.

These particular questions thus arise:

(1) What is the meaning that in this reservation should be given to petroleum?

(2) What right, if any, have the defendants to produce the oil if, in the process of extracting the petroleum reserved, they thereby use, waste or interfere with the natural gas?

It may well be stated now that if the plaintiff's contention should prevail that all natural gas whether wet, dry or in solution, is the property of the plaintiff, then the gas in solution and the gas in the gas-cap over the petroleum will be interfered with and used and some of it wasted in the process of extracting the oil.

Then there is a third question urged by the defendants. That there should be a new trial as the plaintiff called and examined as witnesses more than three persons who gave opinion evidence, contrary to Section 10 of The Alberta Evidence Act.

Simon Borys, father of the plaintiff, purchased the quarter from the railway company in 1906. He had come to Alberta from Austria in 1897 and settled in the Leduc district and took up a homestead on which he still lives and had acquired by assignment, an agreement for the purchase of a C.P.R. quarter, and in 1901 purchased another quarter directly from the C.P.R., which apparently only reserved to the railway company the coal and valuable stone. He bought this last mentioned quarter from the railway's agent at Leduc, for a farm, and the agent told him that he had ten years within which to pay for the land and that the railway company was keeping the coal and some kind of stone. As Simon could not read or speak English any conversation with the agent was done by an interpreter. Simon purchased the quarter with which this action is concerned from the railway company in 1906. It was explained to him, also through the same interpreter, that there was a difference between this quarter and the one he had previously purchased as the company was keeping the petroleum in addition to the coal and stone. There being no word in the Ukrainian language for petroleum, it is likely the Ukrainian word "oliva" was used, meaning oil.

By the land contract, Simon was to make certain agricultural improvements and pay $1280.00 and upon this being done, to receive from the railway company a transfer of the land reserving unto the company all coal, petroleum and valuable stone.

He received a transfer with the above reservation in 1918 which transfer was registered in 1920. He subsequently transferred the quarter to his wife who died and her executors transferred the quarter to the plaintiff who was registered as owner on the 18th December 1947.

In 1947 the Imperial Company brought in a producing well in the Leduc area and the reservation in the quarter in question became of importance.

The area within which the land here is situate is known as the Leduc-Woodbent oil field and is a producing field. Many producing oil wells have been drilled by the Imperial Company and other oil companies.

Mr. Gustafson, the engineer in charge of all

engineering in connection with Imperial Company drilling and development and production in the field, testified with respect to the development of the field to March 1950. He produced charts showing the results of the development to that date and also the geological formations, that is, the rock strata, encountered at various depths.

There are two main producing horizons, - the first being Nisku (D-2) and the second, Leduc (D-3), the latter being the more prolific of the two. Above the Nisku (D-2) horizon oil and gas may also be encountered.

The field has been tested and it may be concluded with certainty that on the plaintiff's land oil in paying quantities will be found in the Nisku (D-2) formation. The oil in this horizon will have gas in solution but without any gas-cap. Then, lower down, in the Leduc (D-3) formation will be found the more prolific horizon with gas in solution and with a gas-cap. A gas-cap is described as free natural gas, in contact with, resting on, or floating on, the oil beneath. It should be added that the oil and the gas, whether free or in solution, is while in the earth under great pressure.

The agreement with Simon Borys was merged in the transfer to him in 1918; still the agreement is admissible in evidence to shew what the parties meant by the reservation. See the reasons of Ford, J. (now J.A.) in Knight Sugar Company Limited v. Alberta Railway and Irrigation Company (1935) 3 W.W.R. 86 at 90 et seq. This agreement is not helpful.

There is a sharp contention between the parties as to the meaning to be ascribed to the reservation.

Such being the situation, we must ascertain the knowledge of the parties at the time of the original agreement and all the surrounding circumstances to determine, as best we may, what the parties to the agreement intended by the reservation. Scientific knowledge of petroleum, Simon Borys evidently did not have and there is not sufficient evidence that the railway company intended any meaning different than the one in common use.

Both before and after Alberta was created a province in 1905, and until 1930, the public lands including the minerals, belonged to Canada and were administered by Canada in accordance with the provisions of The Dominion Lands Act. Prior to 1906 various regulations were passed by Order-in-Council applicable to different minerals with particular reference to petroleum but until 1906 without any reference to natural gas. From 1906 onwards the regulations refer to petroleum and natural gas as if they were separate and distinct substances. For example, P.C. Order No. 2287 of December 26th, 1906, (included in Ex. 26) provides that the regulations "for the reservation and sale of petroleum lands shall apply also to the reservation and sale of lands for natural gas purposes". From that date onward both petroleum and natural gas are referred to in relevant regulations.

Similarly, provincial statutes dealing with petroleum and associated hydrocarbons appear to treat petroleum and natural gas as different substances. Reference will be made, later, to The Oil and Gas Resources Conservation Act, 1950, Ch. 46, Statutes of Alberta, where the distinction is clearly made.

The appellants' witnesses are no doubt eminent scientists. Their definition of petroleum, as a word which includes all associated hydrocarbons whether gaseous, liquid or solid, is a definition for use by scientists, and is not the meaning commonly given to it in this country.

The trial judge found that petroleum and natural gas were, by common usage, two different substances, and that conclusion ought not to be disturbed. I am, however, with respect, unable to agree with him that the reservation "petroleum" did not include gas in solution in the liquid as it exists in the earth. What was reserved to the railway company was petroleum in the earth and not a substance when it reached the surface. It is true that by change of pressure and temperature, gas is released from solution when the liquid is brought to the surface but such a change ought not to affect the original ownership.

In other words, petroleum includes gas and any other hydrocarbon and natural gas existing in its

natural condition in strata.

In my opinion, all the petroleum reserved, including all hydrocarbons in solution or contained in the liquid in the ground, is the property of the defendants who are entitled to do as they like with it, subject, of course, to the observance of all relevant statutory provisions and regulations.

All gas not included in the reservation of petroleum as indicated is the property of the plaintiff. These conclusions, however, do not dispose of the action. The defendants naturally wish to extract the petroleum from the earth and this cannot be done without interference with the plaintiff's gas and some of it would be wasted. To this interference and waste, the plaintiff objects.

To this objection the trial judge gave effect and enjoined the oil company from interfering with or wasting the plaintiff's gas. This aspect of the appeal will now be considered.

Before doing so, it is advisable to shew why in the extraction of petroleum from the earth, it is necessary to use and interfere with the gas above, and reference will also be made to the provincial legislation respecting the production of oil and gas.

The Evidence shews that the petroleum in the reservoir is brought to the surface by the pressure or force of the gas in solution: the downward pressure of the gas in the gas-cap which overlies the petroleum and the upward pressure of the water underlying the petroleum. It also shews that for the maximum production all three forces are necessary. The evidence is, that these three different forces must be used in moderation and regulated and without undue force from any one of them. It should be added that the liquid is also brought to the bottom of the well stem by gravity, that is to say, the liquid will gravitate downwards from the upper portions of the reservoir as that in the lower part is withdrawn. This gravitation need not be considered further. It might well be stated that there is never a complete recovery of the liquid, some is always held by surface tension in the pores or openings in the rock constituting the oil bearing formations, but unless the

forces of the various pressures are regulated, much more liquid is left in the reservoir and is lost.

The Legislature of the Province has enacted legislation for the maximum production and use of petroleum and gas and to prevent undue waste of both substances.

The present relevant legislation is The Oil and Gas Resources Conservation Act, 1950 (supra). The object and application of the Act is stated in Sec. 3:

> "3. The intent, purpose and object of this Act is,-
> (a) to effect the conservation of the oil and gas resources of the Province; and
> (b) to prevent the waste thereof; and
> (c) to regulate the drilling, production and abandonment of wells and all other operations for the production of oil or gas; and
> (d) to give each owner the opportunity of obtaining his just and equitable share of the production of any pool."

A Board was constituted to effect the intent, purpose and object of the Act. This Board with the approval of the Lieutenant Governor in Council, may make just and reasonable regulations as the Board deems requisite. The Act and the regulations are clearly intended to see that every oil and gas well will be efficiently drilled and operated to carry out the object of the Act as set out in Sec. 3, quoted above.

It being necessary to use and interfere with the gas in the extraction of the petroleum beneath, the question is, What are the principles of law applicable to the respective positions of the parties? No complaint is made with respect to the surface of the land and the Imperial Company has an order given under The Right of Entry Arbitration Act to enter upon and use such portion of the land as might be required for its purposes.

In support of his conclusion enjoining the defendants from interfering with the plaintiff's gas estate, the Chief Justice cited and relied upon Fuller v. Garnean (Alta.) (1920) 1 W.W.R. 154; on appeal (1920)

1 W.W.R. 619; and on appeal to the Supreme Court of Canada, 61 S.C.R. 450; and Hext v. Gill (1872) L.R., 7 Ch. 699.

The former case is from the courts of this Province. The question there was as between the effect in the Patent from the Crown of the reservation "reserving thereout and therefrom all mines and minerals which may be found to exist within, upon or under said lands together with full power to work the same and for this purpose to enter upon and use or occupy the said lands or so much thereof and to such extent as may be necessary for the effectual working of the said minerals" and a mere reservation of the mines and minerals without any provision to win, work and obtain the same as contained in the agreement for purchase by the plaintiff. The case was taken to the courts on the pleadings. Both the trial judge and the appellate division were of the opinion that both reservations were of equal import. The majority of the judges of the Supreme Court of Canada were of a different opinion. Duff, J. (later C.J. of Canada) said at p. 456:

> "I have come to a definite conclusion that the reservation of the right to work in terms of the Patent confers wider rights than an exception in the more limited form. It is established doctrine that the right to work in such a way as to let down the surface does not arise under an exception of 'mines and minerals' unless there is something in the terms of the deed which expressly or by necessary implication gives such a right."

and on page 458, Anglin, J. (later C.J. of Canada) said:

> "The implication in the mere reservation of them (mines and minerals) in a grant of land of the right to win, get and take away the minerals is recognized by a long series of authorities. The powers which this implied right gives are well stated by Kekewich, J. in Marshall v. Barrowdale (1892) 8 Time L.R. 275. They may be formulated in terms not dissimilar to those above extracted from the Crown grant."

and at 459:

"But the right so implied is always subject to the condition that its exercise shall not prejudice the surface owner's natural right to support is conclusively established by many authorities in English courts....."

To the like effect are the conclusions of Mignault, J. It will be observed that these judgments refer only to a subsidence of the surface. I am not overlooking the headnote quoted at p. 463 by Mignault, J. to Butterley v. New Hucknall Colliery Co. (1909) 1 Ch. 37, "that the owner of the surface or of the higher seam intends to reserve his common law right of support".

A case is only an authority for what is necessary for the decision and no more. Fuller v. Garneau decides only what has been first quoted from the observations of Duff, J. The authorities referred to only serve to illustrate that a mere reservation of a mineral does not give the mine operator permission to cause a subsidence of the surface.

In Hext v. Gill (supra) the decision there was and I quote from the headnote, pp. 669 and 670:

"The surface owner was entitled to an injunction to restrain the owner of the minerals from getting it in such a way as to destroy or seriously injure the surface."

I am not in agreement with the trial judge when he says at p. 163 of his reasons, "In my opinion destruction of the plaintiff's estate in the natural gas may be likened to the destruction of the surface estate referred to in the foregoing authorities". The principles applicable to the support of the surface of land should not apply to the rights to underground property such as water, oil and gas.

The remarks of White, J. (later Ch.J. of U.S.) in Ohio Oils Co. v. Indiana, Vol. 177, Sup. Ct. of U.S. at 200, are pertinent. Justice White points out that oil and gas are commingled and contained in a natural reservoir and are capable of flowing from place to place and are susceptible of being drawn off by wells from other points provided they penetrate into the reservoir.

The effect of his judgment is this, that gas and oil are substances of a peculiar character and decisions in cases of mining for coal and other minerals cannot be applied to them without qualification and that water and oil and still more strongly gas may be classed by themselves.

In Acton v. Blundell, 12 M. & W. 324; 152 Eng. Rep. 1223, where Tindall, C.J. held that the owner of land through which water flows in a subterraneous course has no right or interest in it which will enable him to maintain an action against a landowner who, in carrying on mining operations in his own land in the usual manner, drains away the water from the land of the first mentioned owner and lays his well dry. The Chief Justice held that the law governing running streams on the surface did not apply to springs or water beneath the surface of the earth. He said at p. 1233:

> "Considering therefore the state of circumstances upon which the law is grounded in the one case to be entirely dissimilar from those which exist in the other; and that the application of the same rule to both would lead, in many cases, to consequences at once unreasonable and unjust; we feel ourselves warranted in holding upon principle that the case now under discussion does not fall within the rule which obtains as to surface streams, nor is it to be governed by analogy therewith."

In Humphries v. Brogden, 12 Q.B. 740; 116 Eng. Rep. 1048; an action against the operators of a mine the working of which let down the surface of the land above, and the defendant operator sought to apply the reasoning of Chief Justice Tindall in Acton v. Blundell (supra). Campbell, C.J., in refusing to apply the principles governing the effect of mining operations to running water, said at 1053 E. Rep:

> "But the right to running water and the right to have land supported are so totally distinct; and depend on such different principles, that there can be no occasion to show at greater length how the decision is inapplicable."

Counsel for the plaintiff, respondent, cited and relied upon Whitehead v. Parks, 157 Eng. Rep. 358.

Lord Derby had granted to the plaintiff's assignor several parcels of land and it was found as a fact that he had granted specifically all streams and springs of water in or under four of these parcels, reserving however to himself the mines and minerals under all of the demised land. Subsequently, to the above demise, Lord Derby leased to the defendant certain mines under the land. It was found that the mining operations either caused the water from the streams or springs to disappear or to be so impregnated with iron as to be unfit for use in the plaintiff's bleaching business. The Court was unanimously of the opinion that the plaintiff must succeed as Lord Derby having made a demise of these streams or springs could not derogate from his own grant. It was under these facts and circumstances that Martin, B. made the observation in his reasons, "It is not material to inquire whether Lord Derby and his lessees may or may not be able to get the coal under the land," which was referred to by Counsel for respondent. It should be observed, however, that Lord Derby had specifically and eo nomine granted the springs and streams of water and could not therefore later derogate from his own grant. This was the view of the Privy Council in its consideration of the case in The Ballacorkish Silver, Lead and Copper Mining Company Limited v. George W.D. Harrison and others (1873) 5 P.C. 49.

Before discussing this authority it might not be amiss, no doubt unnecessary, to observe that at the time of the sale by the railway company to Simon Borys and at the time of the transfer to him by the company, neither party could have had knowledge of the existence of petroleum or of natural gas on the land or within its vicinity, and the court may assume that neither party were aware of what effect the drilling for petroleum would have on any natural gas encountered.

In Ballacorkish v. Harrison (supra) the headnote in part reads:

> "The holder of a mining lease from the Crown is not liable to make compensation for the withdrawal by percolation into his mine of water which would otherwise have flowed into, or having flowed into, would have been retained in the wells and springs of the superjacent land."

The reasons of the Board were given by Lord Penzance. The defendants admitted their liability for any damage to the surface. It followed that, p. 60: "The question, therefore, is narrowed to the point whether, upon the general principles of law applicable to their respective positions, or upon the custom of the island, the appellants are responsible for the damage done to the springs." The legal rights of the parties were considered independent of any custom. His Lordship points out that Acton v. Blundell (supra) is conclusive authority for the proposition that the disturbance or removal of the soil of a man's land which results in the drying up of his neighbour's spring or well or interference with the water percolating away so that it ceases to flow along channels as it formerly did, or having found its way to the spring or well, ceased to be retained there, do not constitute an invasion of a legal right and will not sustain an action. He held that the principles applicable to laterally adjacent properties (as was the case in Acton v. Blundell) are equally applicable to vertically adjacent properties. At p. 62 the legal effect of the reservation is defined:

> "The legal effect of such an exception is undoubted, it was commented on by Lord Hatherley in the case of Proud v. Bates, 34 L.J. (N.S.) Eq. 411, 'There is no doubt', he says, 'but that the mines are altogether out of the demise; and never having been demised or parted with at all, the defendants are at liberty to use them as they think fit'. "

> "If, then, the lord is thus possessed of the mines as of his own original title in the soil, he has all the rights incidental to that ownership, and among others, he has the right to the use of all waters found thereon and percolating by natural process into the mines when opened. He may apply such waters too in any way he pleases, or he may simply remove them and cast them away."

As His Lordship points out at 63: "To hold otherwise might not improbably result in rendering the reservation of mines and minerals wholly useless."

Reference was also made to the case of Whitehead v. Parks (supra) relied upon by Counsel for the plaintiff, but as Lord Penzance points out, "in that

case there was a lease and a distinct grant of the injured springs eo nomine and the injury was the act of one who claimed under the lessor, so that the question resolves itself into the meaning and construction of the words used in the lease and did not depend on the rights to be assigned by the law to persons standing in certain relations of title to one another....."

Returning to Fuller v. Garneau (supra) where at 458 Anglin, J. cites with approval the remarks of Kekewich, J. in Marshall v. Barrowdale (1892) 8 Times L.R. 274, respecting the implied rights of the grantor in a mere reservation of mines and minerals. At p. 275 of the report it is stated by Kekewich, J.:

> "A grant of minerals necessarily implies a right to dig and carry away; and so the Crown grant, which does not express this privilege, is equivalent to the later deeds which do. What else is implied in such a grant according to the authorities and the ancient maxim on which they are all founded? Something, nay; it may be said much more. Claiming under such a grant you are at liberty to use all reasonable means for realizing that which has been granted to you.....Further you are at liberty to do whatever is reasonably necessary for the use of these means, even though it involves temporary disturbance of the surface. Destruction or permanent disturbance of the surface is unreasonable."

The mere reservation of mines and minerals implies the right to get them. So said Lord Wensleydale in Rowbotham v. Wilson, 30 L.J. Q.B. 52; 8 H.L. Cases 348. He states the law in these words:

> "As they (mines and minerals) were to be enjoyed, a power to get them was a necessary incident to such a grant. Shep. Touch. put that instance declaring that by grant of mines was granted the power to dig them: and a similar presumption arose that the owner of the mines was not to injure the owner of the soil above, if it could be avoided."

The language of Lord Wensleydale is somewhat different in the report of the case in 11 Eng. R. 463 at 468. To

like effect are Cardigan v. Armitage (1823) 107 E.R. 356 and Duke of Hamilton v. Graham (1871) L.R. 2, Sc. App. 166 at p. 171.

The plaintiff here says that notwithstanding the reservation the defendants must not interfere with his gas rights and thus the reservation becomes ineffective and useless and as Lord Penzance says in Ballacorkish v. Harrison (supra) and which has been quoted, "the owner of the surface would hold the owner of the mines at his mercy", which precisely is the result here if the plaintiff's contention should prevail.

From these authorities these conclusions follow, that the reservation of the petroleum in the grant of the land enables the appellants to use all reasonable means to extract the petroleum from the earth; that gas in the earth may be likened to subterranean waters and they are subject to like principles of law.

In my opinion, the defendants are entitled to extract all the petroleum from the earth, even if there is interference with and a wastage of the plaintiff's gas, so long as in the operations modern methods are adopted and reasonably used and the provisions of the relevant statute and regulations are observed which, of course, must be observed.

This conclusion is in accordance with the views expressed by Cozens-Hardy, M.R. at p. 46 and Farwell, J. at 53 in Butterley Company Ltd. v. New Hucknall (supra).

Farquharson v. Barnard Argue Roth Stearns Oil and Gas Co., 22 O.L.R. 319 (trial); 25 O.L.R. 93 (on appeal); and (1912) A.C. 864, was cited and relied upon by both parties and is referred to by the Chief Justice in his reasons. The reservation in that case is different from the reservation here; and it would not appear from the report of the case at the trial that gas was so essential to bring the oil to the surface as here nor was its use regulated by statute. The problem before the court in that case is not the same as the problem here. Further, there was some amicable arrangement between the parties, where there was mixed oil and gas and each had a commercial value, to work the wells and

adjust the returns. There is no such arrangement here.

The Chancellor does comment on some characteristics of gas and oil and at p. 337 says: "They resemble water in this, that they will, under pressure, rise and flow and spread, and may be drawn away from one well to another miles off". In the Privy Council, Lord Atkinson, who gave reasons for the Board, does make an important observation; at p. 871 of the P.C. report, he says, and I will quote his words:

> "The company are clearly entitled to search and work for oil in these springs of oil, and to win and carry it away from them, provided they do so in a reasonable manner, and do as little injury as is practicable. While the point does not arise in this appeal for decision, their Lordships think that the company would not be responsible for any inconvenience or loss which might be caused to the respondent or to the owners of the estate of the grantee in the conduct of their operations in the manner mentioned."

True, there is here no win, work or carry away clause, as in the Barnard case but from the authorities referred to and from the statement of Anglin, J. in Fuller v. Garneau (supra), Lord Atkinson's remarks would apply to the extraction of petroleum under a mere reservation as is the case here.

It is not necessary to consider whether the plaintiff called and examined more than three witnesses who gave opinion evidence. Even if such was the case I am of opinion that there was no substantial wrong or miscarriage of justice occasioned thereby.

The appeal should be allowed. The plaintiff will be entitled to judgment in the action and the defendants entitled to judgment on their counterclaim, as indicated in these reasons. The injunction should be vacated.

The appellants will have the costs of the appeal. As success is divided there will be no costs of the trial.

"H. H. PARLEE"
J.A.

Calgary,
February 6th, 1952.

"I concur - G. B. O'Connor, C.J.A."
"Frank Ford, J.A."
"I concur - Clinton J. Ford, J.A."

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JUDGMENT OF THE HONOURABLE MR. JUSTICE W.A. MACDONALD
(Dissenting)

MACDONALD, W.A. - (Dissenting)

The respondent, Micheal Borys, is the owner of an estate in fee simple, in the northeast quarter of Section 19, Township 50, Range 26, West of the 4th Meridian, in the Province of Alberta, "reserving thereout all coal, petroleum, and valuable stone". In this action he seeks a declaration that he is the owner of the natural gas within, upon or under this land, and an injunction restraining the appellants from using, removing, wasting, intefering with or otherwise disposing of said natural gas.

The chain of title of the respondent to this land may be traced briefly, as follows:- On the 13th of September, 1906, the Canadian Pacific Railway Company, one of the appellants, was the registered owner of the lands above referred to, and entered into an agreement for the sale thereof to Simon Borys, the father of the respondent, for $1280.00, payable by instalments. The agreement provided that upon making the payments and performing the various conditions by him to be performed, the purchaser would be entitled to a deed or patent conveying this land to him, subject to the reservation above set forth.

On the 17th of January, 1918, the Railway Company executed a transfer of this land "reserving unto the Canadian Pacific Railway Company, their successors and assigns, all coal, petroleum and valuable stone which may be found to exist within, upon or under the said land." On the 19th of November, 1920, this trans-

fer was registered and Certificate of Title to the land, subject to this reservation, was issued in the name of Simon Borys. Subsequent conveyances of the land were made, and on December 18th, 1947, the respondent, Micheal Borys, became the registered owner thereof subject to the above reservation.

On the 21st of September, 1949, the Canadian Pacific Railway Company leased to Imperial Oil Limited "the petroleum (hereinafter referred to as the leased substance) which may be found within, upon or under the said land and the right to work, win and carry away the same". On the 15th of December, 1949, this lease was registered in The Land Titles Office as No. 7446 H.J.

The main question involved is, what is the true construction of the reservation? Did the Canadian Pacific Railway Company, when it sold the land to Simon Borys, reserve to itself the natural gas within, upon or under the said land? It did not do so expressly, but it takes the position that the petroleum reserved includes natural gas. It alleges that it owns all the petroleum and all the natural gas underlying this land, and that the Imperial Oil Limited by virtue of its lease, is entitled to work, win and carry away the petroleum, including the natural gas. The Imperial Oil Limited asserts the same claim, and, in the alternative, alleges that if it has not the right to work, win and carry away the natural gas, it has the right to work, win and carry away the natural gas occurring in the same reservoir with the petroleum in its liquid phase, as well as the natural gas contained in solution in the petroleum; and, furthermore, it asserts the right, without compensation to the respondent, to use and dispose of such natural gas as may be necessary or incidental to its efforts to work, win or carry away the petroleum in its liquid phase.

In reply, the respondent alleges, inter alia, that, having regard to the time at which the Railway Company reserved the coal, petroleum and valuable stone, and the facts and circumstances then existing, it was not the intention of the parties to reserve the natural gas.

The action was tried by the learned Chief Justice of the Trial Division, who held that the word

"petroleum" in the reservation did not include natural gas, that the natural gas under these lands was the property of the respondent, and that the interlocutory injunction granted in these proceedings on the 1st of March, 1950, should be made permanent.

This appeal is from the whole of the judgment of the learned Chief Justice.

A great deal of evidence, largely of a technical and scientific character, was adduced on the trial in an effort to establish that the word "petroleum" in the reservation includes natural gas. Dr. Lewis, a consulting petroleum geologist and engineer, of Houston, Texas, says that those concerned with the production, origin and chemistry of oil and gas felt the need of a generic word which would include all the naturally occurring hydrocarbons of common origin, and the word adopted for this purpose was "petroleum". In his opinion, the correct meaning of "petroleum" in 1906 and today, is the broad, generic meaning. He considers the restriction of the word to hydrocarbons in the liquid phase to be a secondary and incomplete use of the term. The evidence of Dr. Katz and Dr. Fancher, both consulting petroleum geologists of repute, is to the same effect. Mr. Davies, a petroleum engineer, who has been engaged actively with problems relating to petroleum in Alberta, says that to him the word "petroleum" means a mixture of hydrocarbons, gaseous, liquid and solid.

On the other hand, it should not be overlooked that admittedly the original meaning of the word "petroleum" was rock oil or mineral oil, and this original use of the word has not been superseded by the modern generic term, but has persisted and is still in common use at the present day. It may also be noted that the expert geologists from the United States had not examined our legislation, whether Federal or Provincial, dealing with petroleum or natural gas, or the regulations made pursuant thereto. They had not examined the regulations of the Canadian Pacific Railway Company, dating back to 1914, for the disposal of its petroleum rights, nor the forms of leases in common use by Imperial Oil Limited. In general, they were not familiar with Canadian literature on petroleum and natural gas in Canada. It is quite obvious that under the legislation, regulations and literature above referred to, the word petroleum

was frequently used in its narrow, original sense, as meaning crude oil, and was dealt with as something different and distinct from natural gas. Any efforts to dovetail the term "petroleum" in its broad "inclusive" sense into sections of the legislation, regulations and forms above referred to, were unimpressive.

It is urged that "all petroleum" is a technical and scientific term, and in this sense includes hydrocarbon gases as well as liquids and solids of similar origin. On this premise, the argument is advanced that technical or scientific words should be given their technical or scientific meaning, and that therefore the word "petroleum" in the reservation should be interpreted in its broad, scientific sense. The issue here, as I see it, is whether or not the word "petroleum" in the reservation includes natural gas, and until this issue is finally determined, all discussion with respect to the law applicable to the proper interpretation of technical and scientific terms is beside the point.

Scientists frequently differ sharply in their opinions, and that situation confronts us here. Dr. Nauss, a consulting geologist, familiar with the situation in this Province, whose evidence impressed the trial judge very favourably, says that the technical meaning and the popular meaning of "petroleum" are one and the same. In his view, petroleum is crude oil and natural gas is not a part of it. He points out that in proceedings before the Natural Gas Conservation Board in this Province, all the expert witnesses included gas in solution as part of the natural gas reserves of the Province. There is also evidence of Mr. Slipper, a geologist and engineer, with long experience in natural gas and petroleum industries. He says petroleum means ordinary crude oil and does not include natural gas. If he sought a broad generic term to include hydrocarbons of common origin, he would use the term "natural hydrocarbons" and not petroleum.

In interpreting the language of the reservation, the learned trial judge adopts the language of Lord Atkinson in Farquharson v. Barnard-Argue-Roth-Stearns Oil and Gas Co. Ltd. (1912) A.C. at page 869, as follows:

"Having regard to the time at which the documents between the parties were executed and the facts and circumstances then existing, what did the parties to the documents intend to express by the language which they have used, or in other words, what was their intention touching the substances to be excepted as revealed by that language."

The issue involved is an issue of fact. The rule laid down by James, L. J., in Hext v. Gill (1872) 7 Ch. p.699, and approved and adopted in North British Ry. Co. v. Budhill, (1910) A.C. 116, and in Caledonian Ry. Co. v. Glenboig, (1911) A.C. 290, applies here. The question to be determined in each case is what the words meant at the relevant time in the vernacular of mining men, commercial men and landowners.

It is true that in the Budhill case (supra) the question was whether or not sandstone was a mineral, and in the Glenboig case (supra) the question was whether or not fireclay was a mineral. But in Isle of Man v. Moore (1928) 3 All E.R. 263, the sole issue in the argument before the Privy Council was whether or not shale was included in a reservation in favour of the Crown of "flagg, slate or stone", and it was held that this was an issue of fact to be determined in accordance with the rule laid down in the Budhill and Glenboig cases.

Under the agreement for sale and the subsequent transfer, the proprietory right to the land involved was transferred to Simon Borys. The onus is on the transferor to show what the reservation includes, and the language of the reservation is to be construed strictly and not extended beyond what the words used clearly cover. North British Ry. Co. v. Budhill (supra) at page 126.

There was a mass of evidence, viva voce and documentary, to indicate that at all relevant times petroleum was commonly known as crude oil, and different and distinct from natural gas. The learned trial judge accepted this evidence in preference to evidence led by the appellants to show that the word had a broad generic meaning which included natural gas.

In determining what the parties to the agreement and the subsequent transfer intended to express by the language used in the reservation, regard must be had to the facts and circumstances then existing. Simon Borys is an Ukrainian whose knowledge of the English language was, at the date of the agreement, quite limited. Indeed, on the trial of this action, he gave his evidence through an interpreter. There is no word in the Ukrainian language for petroleum, but it does contain a word which, when translated into English, means oil. Some years prior to this deal, Borys had purchased a quarter section from the Canadian Pacific Railway Company, through its station agent at Leduc, and in the contract covering the deal, it would appear that petroleum was not reserved. He purchased the land involved in these proceedings through the same agent, and he says the agent informed him that this contract was the same as the previous one, except the price, and the fact that the oil on this quarter belonged to the Canadian Pacific Railway Company. It seems to me it would be somewhat remarkable if, under these circumstances, Borys were to ascribe to the word "petroleum" the broad generic meaning, inclusive of natural gas, which appellants say it means in the reservation, a meaning which was rejected by eminent geologists on the trial, and one which the witness Garrett, a professional engineer and natural gas consultant, with over 27 years' experience in the industry, says he never heard of until this case arose. Furthermore, the trial judge finds that at all material times the Canadian Pacific Railway Company regarded petroleum as the equivalent of mineral oil, and regarded natural gas as a distinct and different substance. There is ample evidence to justify this finding.

Natural gas was known to exist in some sections of the Province in 1906, and in Medicine Hat it was used commercially to a very limited extent. But it was a "waste dangerous product" then, according to Dr. Nauss, (A.B. p.182) and for many years thereafter, In the nineteen-twenties-and-thirties measureless quantities of natural gas were burned and destroyed in Turner Valley because apparently no market for it existed, and its preservation would serve no useful purpose. It is significant that in the lease from the Railway Company to Imperial Oil Limited, dated September 21st, 1949, there is a covenant by the lessee to

protect the leased area from drainage of the leased substances, by drilling a well to offset a well on adjoining land; but if the drainage consists of gas only, the lessee is not obliged to drill an offset well unless an adequate and commercially profitable market for any gas which may be produced therefrom can be previously arranged.

I do not think the Canadian Pacific Railway Company was concerned in 1906 to retain to itself natural gas for which no commercially profitable market was then available, and which was wasted or destroyed as soon as produced. It was not until 1912 that it expressly reserved gas. Nor can I persuade myself that the parties to the agreement and the subsequent transfer ever contemplated the use of the word "petroleum" in any sense other than its usual and popular sense, which, on the evidence, meant the liquid phase of petroleum or mineral oil, and did not include natural gas. They were plain, blunt men, governed by ideas of every-day life, engaged in a simple transaction concerning the sale and purchase of a quarter section of land, and using the plain language of their day and their station to express what they had in mind.

With the exception of the minerals reserved, the transfer to Borys conveyed to him all the interest of the Canadian Pacific Railway Company in this land, including the natural gas. Two separate and distinct estates, held by separate and distinct titles, came into existence. There is nothing in the record to suggest that the natural gas was subject to any servitude in favour of the oil or that it was to be held by the transferee subject to any use or enjoyment thereof by the transferor or its assigns. No express right to win, work or take away the oil is contained in the reservation. There is, of course, a right by implication to get it and to carry it away. But this implied right is subject to important limitations. As was pointed out in Fuller v. Garneau, 61 S.C.R., 450, it is always subject to the condition that its exercise will not prejudice the surface owner's natural right to support. "The surface cannot be destroyed however necessary it may be to do so for the practical working of the mines." Per Anglin, J., at p. 459.

At one time it was thought that the protection

afforded the surface owner was based on some right in the nature of an easement, but this theory has long since been abandoned. The true position was laid down in Backhouse v. Bonomi, 9 H.L.C., 503, 11 E.R. p. 825;

> "I think it perfectly clear that the right in this case was not in the nature of an easement, but that the right was to the enjoyment of his own property, and that the obligation was cast upon the owner of the neighbouring property not to interrupt that enjoyment." Per Lord Wensleydale.

This view has been reiterated and affirmed from time to time in a large line of cases. Lord Selborne in Dalton v. Angus, 6 A.C., at p. 791, refers to the right of support as "a right of the owner to the enjoyment of his own property, as distinguished from an easement supposed to be gained by grant; a right for injury to which an adjoining proprietor is responsible upon the principle sic utere tuo ut alienum non laedas". And subsequently, in Love v. Bell, 9 A.C., 286, an Inclosure Act case, he says:- "I apprehend that before the inclosure, as much as afterwards, the lords, in the exercise of their powers as to the minerals, were subject to the principle 'sic utere tuo ut alienum non laedas'. They had not a right of working paramount to the surface rights of the commoners, they had only a right of working subject to the surface rights of the commoners, and any working which would substantially interfere with those surface rights would have been an unlawful working, and might have been restrained at the suit of the commoners."

The nature of the right of the surface owner is discussed by Lord Macnaghten in West Leigh Collieries Co. v. Tunnicliffe & Hampson Ltd., (1908) A.C., at page 30. The claim was for damages for depreciation in the value of the property attributable to the risk of future subsidence, and Lord Macnaghten says:

> " If one examines this claim in respect of depreciation, and tries to investigate its origin, it will be found, I think, that it really depends upon a notion, which is now exploded, that the right of the surface owner is a right in the nature of an easement, or a

"right to have pillars of support left for his security, while, in reality, his right, as Lord Wensleydale observes, is merely the right of a landowner to the ordinary enjoyment of his land."

The right of the surface owner to the ordinary enjoyment of his land without interference by mining operations, is based, in the final analysis, on the principle that everyone must use his own property so as not to seriously injure or destroy the property of another. This principle governs unless one can find, in the instrument regulating the rights of the parties, some provision which indicates, unequivocally, a contrary intention. Here we have a bare reservation of petroleum or "all petroleum" with no express words conferring any right to win, work and carry away. There is a complete absence of any express arrangement under which appellants might possibly justify interference with the property rights of the respondent in his natural gas.

It is estimated that there are about 3 billion cubic feet of gas under this quarter section. The evidence for the appellants is that a large proportion, if not all, of this gas will be used up in the course of years in the production of the oil. I do not think there is anything either in the evidence or in law which would justify us in allowing this destruction of the respondent's property.

Imperial Oil Limited invokes the provisions of The Land Titles Act and contends that it cannot be affected by the rule of interpretation laid down in the Budhill and Glenboig cases cited above. It is clear that when it entered into the lease, Exhibit 6, full particulars of the title of the Canadian Pacific Railway Company were available to it, and the master agreement between these parties provides that Imperial Oil Limited can only acquire such interest as is possessed by the Railway Company. It is the appellant who takes the position that the word "petroleum", in comparatively recent times, has acquired a new usage. The respondent has never conceded that "petroleum" has or ever had a flexible or wavering meaning. He says it has always retained its original, popular and well-established meaning, without variation or change, and within the

range of that meaning, natural gas is not included. I do not think the respondent is precluded from maintaining this position by any provisions of The Land Titles Act.

Counsel also pointed out that under our Evidence Act, the number of witnesses entitled to give opinion evidence is limited to three on either side, and he argues that the respondent was allowed to call and examine more than three opinion witnesses.

During the whole course of the trial, the position which the respondent took was made quite clear. He asserted that the issue involved was one of fact, - that is to say, what did the word "petroleum" mean in the common speech of mining men, commercial men and landowners? He was entitled to call any number of witnesses to establish the sense in which the word was, in fact, used by the classes of persons referred to. It seems to me that the evidence of Droppo, O'Connor and Garrett was directed to this issue alone, and was not opinion evidence within Section 10 of our Evidence Act. Dr. Fisher, in her evidence, merely produced a collection of authorities which might be conveniently referred to by the Court. In my view, the evidence of the witness Harvey was not opinion evidence, but it is unnecessary to pursue the point so far as his evidence and that of the remaining witnesses is concerned.

The appeal should be dismissed with costs.

"W. A. Macdonald"

J.A.

Calgary, Alberta,
February 6th, 1952.

IN THE SUPREME COURT OF ALBERTA
APPELLATE DIVISION

AT THE COURT HOUSE, in the City of Calgary, in the Province of Alberta, Wednesday, the 6th day of February, A.D. 1952.

PRESENT:
The Honourable G.B. O'Connor, Chief Justice of Alberta,
The Honourable Mr. Justice Frank Ford,
The Honourable Mr. Justice W.A. Macdonald,
The Honourable Mr. Justice H.H. Parlee,
The Honourable Mr. Justice C.J. Ford.

BETWEEN:

MICHEAL BORYS,

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY and IMPERIAL OIL LIMITED,

Defendants
(Appellants)

JUDGMENT ROLL

The appeal of the above named Appellants from the Judgment of the Honourable Chief Justice W.R. Howson, pronounced in the above cause on the 8th day of May, in the year of our Lord, one thousand nine hundred and fifty-one, having come on to be heard before this Court on the 26th day of November, in the year of our Lord, one thousand nine hundred and fifty-one, and continued thereafter on the following days, that is to say, the 27th, 28th, 29th and 30th days of November, in the year of our Lord, one thousand nine hundred and fifty-one, in the presence of counsel as well as for the Appellants as the Respondent, whereupon and upon hearing what was alleged by counsel aforesaid this Court was pleased to direct that the said appeal should stand over for judgment, and the same coming on this day for judgment;

IT IS ADJUDGED that the said appeal be and the same is allowed, and it is hereby adjudged and declared with respect to the lands the subject matter of this action that:

1. Petroleum and natural gas are, by common usage, two different substances.

2. "Petroleum" includes oil and any other hydrocarbons and natural gas in solution or contained in the liquid existing in its natural condition in strata.

3. All the petroleum reserved, including all hydrocarbons in solution or contained in the liquid in the ground, is the property of the Appellants, who are entitled to do as they like with it, subject, of course, to the observance of the relevant statutory provisions and regulations.

4. All gas not included in the reservation of petroleum as above set out is the property of the Plaintiff (Respondent) subject to the rights of the Appellants as set out in the next succeeding paragraph.

5. The Appellants shall be entitled to extract all of the said substances belonging to them from the earth even if there is interference with and wastage of the gas belonging to the Plaintiff (Respondent) so long as in the operations modern methods are adopted and reasonably used, and the provisions of any relevant Statute and Regulations are observed.

IT IS FURTHER ADJUDGED that the injunction granted by this Honourable Court on the 1st day of March, in the year of our Lord, one thousand nine hundred and fifty, and made permanent by the judgment of the Honourable Chief Justice Howson, be and the same is hereby vacated.

IT IS FURTHER ADJUDGED that there be no costs of the trial and that the Appellants do recover from the Respondent their costs of the appeal herein pursuant to double column 5 of the Consolidated Rules of Court, second counsel fee to be taxed Rule 738 not to apply.

"W. K. Jull"
Registrar at Calgary

APPROVED AS BEING THE JUDGMENT MADE:

"H. G. Nolan"
Nolan Chambers Might Saucier Peacock & Jones
Solicitors for Appellant, Imperial Oil Limited.

"R. R. Mitchell"
R. R. Mitchell, Q.C.,
Solicitor for Appellant,
Canadian Pacific Railway Company.

"D. Rae Fisher"
D. Rae Fisher,
Solicitor for Respondent.

ENTERED this 10th day of March 1952
W. K. JULL "T"
Registrar at Calgary.

(SEAL)

: : : : :  : : : : :

NOTICE OF MOTION

NOTICE OF MOTION

TAKE NOTICE that by special leave an application will be made by the Plaintiff at the sittings of the Appellate Division of the Supreme Court of Alberta, to be holden in the City of Calgary, in the Province of Alberta, on Monday, the 11th day of February, A.D. 1952, at the hour of 10.30 o'clock in the forenoon, or so soon thereafter as the application can be heard, for an Order:

(a) Granting leave to appeal to Her Majesty in Council from the judgment pronounced by the Appellate Division of the Supreme Court of Alberta in the above entitled action on the 6th day of February, A.D.1952;

(b) Granting a stay of execution and all further proceedings in connection with the said action pending the said appeal to Her Majesty in Council, and in particular, continuing in force the injunction herein, pending the final disposition of the appeal;

(c) Fixing the amount of security and all necessary conditions in connection with the said appeal to Her Majesty in Council.

AND FURTHER TAKE NOTICE that upon such application will be read the pleadings and proceedings herein, the affidavit of Donald Rae Fisher, filed herein, and all such other material as counsel may advise.

DATED at the City of Calgary, in the Province of Alberta, this 8th day of February, A.D. 1952.

FISHER, FISHER & CHIPMAN,
per: "D. Rae Fisher"
Solicitor for the Plaintiff.

TO:
R. R. Mitchell, Esq.,
Solicitor for the Canadian Pacific Railway Company
(Defendant)

J. Flavelle Barrett,
Solicitor for Imperial Oil Limited
(Defendant)

: : : : : : : : : :

ORDER GRANTING CONDITIONAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL (Respondent)

BEFORE:
THE HON. MR. JUSTICE FRANK FORD
THE HON. MR. JUSTICE W.A. MACDONALD
THE HON. MR. JUSTICE H.H. PARLEE
THE HON. MR. JUSTICE C.J. FORD
) At the Court House, City of Calgary, in the Province of Alberta, on Monday, the 11th day of February, A.D. 1952.

ORDER GRANTING CONDITIONAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL.

UPON the application of the Plaintiff (Respondent) for leave to appeal to Her Majesty in Council from the judgment of the Appellate Division of the Supreme Court of Alberta pronounced the 6th day of February, A.D. 1952, UPON reading the proceedings had and taken herein, the affidavit of D. Rae Fisher filed

AND UPON hearing what was alleged by Counsel for the Plaintiff (Respondent) and by Counsel for the Defendants (Appellants);

IT IS ORDERED that the Plaintiff (Respondent) have leave to appeal to Her Majesty in Council from the judgment of this Court herein pronounced the 6th day of February, A.D. 1952, upon condition of the Plaintiff (Respondent) within three months from the date hereof entering into good and sufficient security to the satisfaction of the Court in the sum of $2,000.00 for the due prosecution of the appeal and the payment of all such costs as may become payable to the Defendants (Appellants) in the event of the Plaintiff (Respondent) not obtaining an Order granting final leave to Appeal or of the appeal being dismissed for non-prosecution or of Her Majesty in Council ordering the Plaintiff (Respondent) to pay the Defendants' (Appellants') costs of this appeal as the case may be, and upon the further condition that the Plaintiff (Respondent) procure preparation of the record and dispatch thereof to England within the period of four months from the date hereof;

AND the Defendants (Appellants) by their Counsel requesting an adjournment of the further application made by the Plaintiff (Respondent) for an Order granting a stay of execution in connection with the action pending the said appeal to Her Majesty in Council, and in particular continuing in force the injunction herein pending the final disposition of the appeal and undertaking that there will be no further drilling on the lands in question, that is to say, the North East quarter of Section 19, Township 50, Range 26, West of the 4th Meridian, in the Province of Alberta, pending the disposition of the said Plaintiff's (Respondent's) application for a stay.

AND IT IS FURTHER ORDERED that the said application for a stay be and the same is hereby adjourned until the 3rd day of March, A.D. 1952;

AND IT IS FURTHER ORDERED that the costs of this Order and the application therefor shall be costs in the cause of the said appeal to Her Majesty in Council.

"A. R. Turner"
Acting Registrar at Calgary

APPROVED AS BEING THE ORDER MADE:
"S. J. Helman"
for Solicitor for the Defendant (Appellant)
Canadian Pacific Railway Company.

Nolan Chambers Might Saucier Peacock & Jones
Solicitors for the Defendant (Appellant)
Imperial Oil Limited.

ENTERED this 12th day of February, 1952.
W. K. JULL "T"
Registrar at Calgary.

(SEAL)

: : : : :  : : : : :

ORDER GRANTING CONDITIONAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL (APPELLANTS)

BEFORE:
The Hon. Mr. Justice Frank Ford
The Hon. Mr. Justice W.A. Macdonald
The Hon. Mr. Justice H.H. Parlee
The Hon. Mr. Justice C.J. Ford

) At the Court House, City of Calgary, in the Province of Alberta, on Monday, the 11th day of February, A.D. 1952.

ORDER GRANTING CONDITIONAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL.

UPON the application of the Defendants (Appellants) for leave to appeal to Her Majesty in Council from portions of the judgment of the Appellate Division of the Supreme Court of Alberta pronounced the 6th day of February, A.D. 1952, and UPON it appearing that the Plaintiff (Respondent) has been granted conditional leave to appeal to Her Majesty in Council from the said judgment by order of the Appellate Division of the Supreme Court of Alberta, dated the 11th day of February, A.D. 1952;

IT IS ORDERED that the Defendant (Appellant) Canadian Pacific Railway Company and the Defendant (Appellant) Imperial Oil Limited have leave to appeal to Her Majesty in Council from so much of the said judgment as is adverse to them; upon condition of the Defendants (Appellants) within three months from the

date hereof entering into good and sufficient security to the satisfaction of the Court in the sum of $2,000.00 for the due prosecution of the appeal and the payment of all such costs as may become payable to the Plaintiff (Respondent) in the event of the Defendants (Appellants) not obtaining an order granting final leave to appeal or of the appeal being dismissed for non-prosecution or of Her Majesty in Council ordering the Defendants (Appellants) to pay the Plaintiff's (Respondent's) costs of this appeal, as the case may be.

AND IT IS FURTHER ORDERED that the appeal to Her Majesty in Council of each of the said Defendants (Appellants) and of the Plaintiff (Respondent) be heard together and on the same transcript record.

AND IT IS FURTHER ORDERED that the costs of this Order and the application therefor shall be costs in the cause in the said appeal to Her Majesty in Council.

"A. R. Turner"
Acting Registrar at Calgary.

APPROVED AS BEING THE ORDER MADE:

"D. Rae Fisher"
for Solicitor for the Plaintiff (Respondent) Micheal Borys.

"S. J. Helman"
for Solicitor for the Defendant (Appellant)
Canadian Pacific Railway Company.

"H. G. Nolan "
Solicitors for the Defendant (Appellant)
Imperial Oil Limited.

ENTERED this 12th day of
February 1952
W. K. JULL "T"
Registrar at Calgary.

(SEAL)

IN THE SUPREME COURT OF ALBERTA
APPELLATE DIVISION

AT THE COURT HOUSE, Edmonton, Monday, March 3, 1952.

PRESENT:
The Honourable Mr. Justice Frank Ford
The Honourable Mr. Justice W.A. Macdonald
The Honourable Mr. Justice H.H. Parlee
The Honourable Mr. Justice C.J. Ford

BETWEEN:

MICHEAL BORYS,

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY and IMPERIAL OIL LIMITED,

Defendants
(Appellants)

O R D E R

The Application of the above named Plaintiff for an Order continuing the Injunction granted at the trial herein until the final disposition of the Plaintiff's appeal to the Judicial Committee of the Privy Council having come on for hearing this day in the presence of Counsel for the Plaintiff and the Defendants;

UPON hearing read the Notice of Motion, the Affidavit of D. Rae Fisher, sworn February 9, 1952, on behalf of the Plaintiff, the Affidavits of John Peake, John Haig Hamlin and Donald D. Lougheed, sworn respectively February 26th, 1952, February 27, 1952, and February 27, 1952, on behalf of the Defendants, and the Affidavit of Robert Pot, sworn February 29, 1952, filed on behalf of the Plaintiff;

And the Court this day being pleased to give its Judgment, IT IS ORDERED AND ADJUDGED that the Interim Injunction granted herein on the 1st day of March, 1950, by the Honourable the Chief Justice of the Trial Division, and by Judgment entered June 26, 1951, made permanent, and by this Court by its decision

on appeal from the said Judgment vacated, be and the same is hereby continued in full force and effect until the final disposition of the Appeal and Cross-Appeal herein to Her Majesty in Council, provided that Counsel for the Appellant take every means to have the said Appeal heard at the Summer Sittings of the Judicial Committee to be held in 1952, reserving however to the Defendants the right to apply further if the said Appeal is not then heard.

10 "W. K. JULL"
"F.F." Registrar

ENTERED this 12th day of March, 1952.
W. K. JULL "R"
(SEAL) Registrar at Calgary.

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20 CERTIFICATE

I, W. K. JULL, Registrar of the Supreme Court of Alberta, Appellate Division, hereby certify that the Defendants (Appellants) herein have deposited in Court the sum of $2,000.00 as security for the due prosecution of their appeal to Her Majesty in Council, and the payment of all such costs as may become payable to the Plaintiff (Respondent)

30 DATED at the City of Calgary, in the Province of Alberta, this 28th day of March, A.D. 1952.

W. K. JULL
(SEAL) W. K. Jull

Registrar at Calgary

ORDER PERFECTING APPEAL

BEFORE:
The Hon. Mr. Justice Frank Ford, ) AT THE COURT HOUSE,
The Hon. Mr. Justice W.A. Macdonald) In the City of
The Hon. Mr. Justice C.J. Ford ) Calgary, in the
) Province of Alberta,
) on Friday, the 28th
) day of March, 1952.

ORDER PERFECTING APPEAL

UPON the application of the Defendants (Appellants) and UPON it appearing that the Defendants (Appellants) have entered into good and sufficient security in the sum of $2,000.00 for the due prosecution of the appeal and the payment of all such costs as may become payable to the Plaintiff (Respondent),

AND UPON hearing counsel as well for the Defendants (Appellants) as for the Plaintiff (Respondent),

IT IS DECLARED that the Defendants (Appellants) have perfected their appeal herein and have otherwise complied with the order of this Honourable Court dated the 11th day of February, A.D. 1952.

AND IT IS ORDERED that the costs of and incidental to this Order and the application therefor shall be costs in the cause in the said appeal to Her Majesty in Council.

"F.F." "A. R. TURNER"
Acting Registrar at Calgary.

APPROVED AS BEING THE ORDER MADE:

"D. R. Fisher"
Solicitor for the Plaintiff (Respondent) Micheal Borys.

"S. J. Helman"
For Solicitor for the Defendant (Appellant) (SEAL)
Canadian Pacific Railway Company.

"H. G. Nolan"
Solicitors for the Defendant (Appellant)
Imperial Oil Limited.

ENTERED this 28th day of March 1952
W. K. JULL "T"
Registrar at Calgary

REGISTRAR'S CERTIFICATE AS TO SECURITY

REGISTRAR'S CERTIFICATE AS TO SECURITY

I, W. K. JULL, Registrar of the Supreme Court of Alberta, Appellate Division, at Calgary, DO CERTIFY that there has been deposited on behalf of Micheal Borys in this Honourable Court to the credit of this action the sum of $2,000.00 for the due prosecution of his appeal to Her Majesty in Council and the payment of all such costs as may become payable to the Defendants, all pursuant to the Order granting conditional leave to appeal to Her Majesty in Council.

IN TESTIMONY WHEREOF I have hereunto subscribed my name and affixed the seal of the Supreme Court of Alberta, this 31st day of March, A.D. 1952.

"W. K. JULL"
Registrar of the Appellate Division of the Supreme Court of Alberta at Calgary.

(SEAL)

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ORDER PERFECTING APPEAL AND GRANTING FINAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL.

IN THE SUPREME COURT OF ALBERTA
APPELLATE DIVISION

At the Court House, City of Edmonton, in the Province of Alberta, on Wednesday, the 2nd day of April, A.D. 1952;

PRESENT:
The Honourable Mr. Justice Frank Ford,
The Honourable Mr. Justice McLaurin,
The Honourable Mr. Justice Egbert.

BETWEEN:

MICHEAL BORYS,

Plaintiff
(Respondent)

- and -

CANADIAN PACIFIC RAILWAY COMPANY and IMPERIAL OIL LIMITED,

Defendants
(Appellants)

ORDER PERFECTING APPEAL AND GRANTING FINAL LEAVE TO APPEAL TO HER MAJESTY IN COUNCIL

UPON the application of Micheal Borys, upon reading the affidavit of D. Rae Fisher, filed, and the Registrar's Certificate as to security, the Certificate of Stanley Reginald Howard, one of the Official Court Reporters as to the Record, and it appearing that by an Order made by this Honourable Court dated the 11th day of February, A.D. 1952, the said Micheal Borys was granted conditional leave to appeal to Her Majesty in Council from the judgment of this Honourable Court pronounced the 6th day of February, A.D. 1952, and upon it appearing that the terms and conditions of the said Order granting conditional leave have been complied with, and upon hearing Counsel as well for the said Micheal Borys as for Canadian Pacific Railway Company and Imperial Oil Limited;

1. IT IS DECLARED that the said Micheal Borys has perfected his appeal herein and has otherwise com-

plied with the Order of this Honourable Court dated the 11th day of February, A.D. 1952;

2. IT IS ORDERED that the said Micheal Borys be granted final leave to appeal to Her Majesty in Council from the Judgment of this Honourable Court pronounced the 6th day of February, A.D. 1952;

3. AND IT IS FURTHER ORDERED that the costs of and incidental to this Order and application therefor shall be costs in the cause in the said appeal to Her Majesty in Council.

"A. R. TURNER"
Acting Registrar - Calgary

APPROVED AS THE ORDER MADE: (SEAL)

"S. J. Helman"
for Solicitor for Canadian Pacific Railway Company.

"H. G. Nolan"
Solicitor for Imperial Oil Limited.

"APPROVED - Frank Ford, J.A., for the Court."

ENTERED this 3rd day of April 1952
W. K. JULL "T"
Registrar at Calgary.

(SEAL)

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