

THE UNIVERSITY OF CALGARY

PUBLIC UTILITY REGULATION IN ALBERTA:

A CASE STUDY OF THE NATURAL GAS

DISTRIBUTING INDUSTRY

by

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Public Utility Regulation in Alberta: A Case Study of the Natural Gas Distributing Industry," submitted by Arthur H. Willms in partial fulfillment of the requirements for the degree of Master of Arts.

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ABSTRACT

Regulated industries in Canada have grown in number and in size to form a pervasive force within our economy. Their importance is easily recognized yet the controls imposed on them and the effects of these controls are neither easily understood nor obvious. This study has the double purpose of analyzing regulatory control in general, and of studying a particular regulated industry--the natural gas distributing industry in Alberta.

The industry in Alberta is characterized by a near monopoly. The control agency, The Alberta Public Utilities Board, is consequently burdened with the task of regulating this industry without the benefit of the diverse experience which could be gained if seller concentration were not so high.

The duties of the Alberta Public Utilities Board are found in The Public Utilities Board Act. Interpretations and actual practices of the Board were extracted from the numerous decisions handed down by the Board. Regulatory control in Alberta does not appear to be radically different from that experienced in other areas. Regulation, which in its present form should more accurately be called arbitration, is characterized by slow, cumbersome and ritualistic case-hearings. Goals of regulation are not obvious, the economic effects of regulation are not considered and the control agency is understaffed. Nonetheless the regulatory climate has been placid and undoubtedly the majority of Albertans feel that it has been successful.

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CHAPTER I

INTRODUCTION AND PLAN OF THE STUDY

The last decade in Canada has been characterized by a clear enunciation of and an increased emphasis on a high rate of economic growth as one of our foremost economic goals.¹ A direct result of this concern has been that more effort has been devoted to gaining a better understanding of the sources of economic growth. Few will argue against the hypothesis that the availability of efficient utilities (natural gas, water, electricity, transportation, communication) operate as a catalyst stimulating growth within an economy. This hypothesis is supported in many sources. "Energy resources are essential to industrial growth."² "In the . . . economies of Latin America, Asia and Africa, one of the impediments to economic development and social betterment has been the shortage of electric power."³ "[Quebec's] progress is due in part to [its] immense forest and mineral riches, but even more to [its] hydro-electric potential which is vast enough to suggest even greater future development."⁴ "The public utility . . . industries are vital to the economic growth of the United States."⁵

This important role of the utility industries was one reason for choosing this general area as a field of study. Another reason, however, was that in spite of its economic importance this area has hardly received the amount of academic attention in Canada that it

deserves. In Alberta the general principles upon which the regulatory agencies work, and the effects of these policies upon the regulated enterprises, have not been subject to specific evaluation. Indeed, the basic facts relevant to any such evaluation lie scattered in a variety of sources. Thus there is great need for observation, analysis, interpretation and evaluation.

By selecting the specific topic indicated in the title of this dissertation, it is hoped that a contribution can be made to the building of a coherent picture of one particular utility and to discuss some of the issues that this picture seems to raise. Thus the purpose of this study is to present a detailed account of the development, implementation and effects of regulatory control on the natural gas distributing industry in Alberta.

The following paragraphs indicate the plan to be followed in presenting this study.

Chapter Two will provide some necessary background material. It will discuss briefly the general nature of public utilities⁶ and the raison d'etre of regulation; it will indicate the importance of public utilities, and in particular the natural gas distributing industry, in the economies of Canada and Alberta; and it will describe briefly the technical aspects of the industry that need to be borne in mind throughout the subsequent discussion.

Chapter Three will consider the growth of the two major companies that dominate the natural gas distributing industry in Alberta. It will analyze the current market structure with emphasis

placed on the concepts of seller and buyer concentration.

In Chapter Four, the major regulatory concepts will be considered. These concepts will first be discussed in general terms, and then the current Alberta practices, gathered from the major decisions of the Alberta Public Utilities Board,⁷ will be critically examined in the light of the general discussion.

Chapter Five will discuss some of the possible effects of regulation on regulated enterprises with emphasis on its possible impact on the level of investment in the industry.

Chapter Six, the conclusion, will present some general observations about regulation of the natural gas distributing industry in Alberta. Policy implications will be cited and, since the author has become aware of important questions that could not be discussed adequately in the present study, references will be made to areas in which further research may usefully concentrate.

FOOTNOTES

¹Economic Council of Canada, Sixth Annual Review (Ottawa: Queen's Printer, September, 1969), p. 4.

²The Alberta Bureau of Statistics, Alberta Industry and Resources 1968 (Edmonton: Government of the Province of Alberta, 1968), p. 66.

³David F. Cavers and James R. Nelson, Electric Power Regulation in Latin America (Baltimore: The Johns Hopkins Press, 1968), p. 1.

⁴Paul Sariol, The Nationalization of Electric Power (Montreal: The Harvest House, 1962), p. 19.

⁵Charles F. Phillips, The Economics of Regulation (Homewood: Richard D. Irwin, Inc., 1965), p. ix.

⁶In this paper a gas utility will be considered a public utility. The Government of the Province of Alberta makes a distinction between a public utility and a gas utility. Both, however, are subject to the supervision of the Public Utilities Board thus the distinction will be dropped.

⁷The word 'Board' will be used in most future occasions instead of the lengthy title 'The Alberta Public Utilities Board'.

CHAPTER II

ORIGIN, NATURE AND IMPORTANCE OF PUBLIC UTILITIES

Purpose

The purpose of this chapter is to present some of the factual information necessary to place the entire study into proper perspective. Historical antecedents of the present regulatory framework provide a basis for the examination of current practices. The importance of the public utility sector within the economy, and specifically the natural gas distributing industry in Alberta, signifies the relevance of the study. Finally, a cursory description of the technical aspects of the natural gas industry provides information vital to the elucidation of concepts presented later.

Nature of Public Utilities

It is rather ironic that the regulatory process has reached its greatest level of application and sophistication in America which has traditionally guarded freedom of enterprise with all of the zeal and vigor that it could muster. The entire concept of a public utility monopoly and a formalized involvement of government in a private endeavor appears alien to the principles of an economic system based upon the merits of competition. A brief examination of the regulatory concept will clarify this confusion.

Rapid economic development caused the accepted rights of the individual to be dramatically altered as the masses recognized that

certain goals were not being achieved by the contemporary business structure. The salient features of the free enterprise system--direct competition between sellers of the same service--was found wanting in certain industries. People became aware that the workings of the free market did not guarantee the desired allocation of resources and this led to the conclusion that these industries had to be regulated by specifically designed acts of government.

Existing concurrently with the fact that competition could not be relied upon to achieve desired results was the overpowering philosophy that private ownership was desirable. This dichotomy was resolved as there developed an entirely distinct branch of industry--privately owned and government regulated--characterized by local monopolies in areas where direct competition was deemed uneconomical,, impractical and, in the final analysis, impossible. Government intervention was used as a substitute for the regulatory role of competition in that it attempted to provide the consumer with benefits similar to those derived under a system of healthy competition. As stated rather brilliantly by Ben Lewis:

There is something quite special about government regulation of the public utility type: this is the way we behave when we are really keyed up about economizing, when we stop acquiescing and 'going along', when we feel quite certain that for reasons we can identify, the process of the free market cannot be made satisfactory to perform the economizing job we want done and, hence, that we must perform the economizing functions by specifically designed laws, agencies and measures.¹

Investor-owned, regulated utility companies therefore differ from ordinary companies in that they often operate under a granted monopoly with prices, profits and the quality of service regulated

by a government appointed body.² These regulated companies are required to provide every customer in their area with as much and as good a service as the customer wants and pays for. Once the company has accepted the responsibility of servicing an area they can not abandon that market without governmental approval. Nor can they extend their system into new markets without the expressed approval of the public authority. In return for these restrictions the regulated companies are granted the power of eminent domain³ and are allowed to earn a "reasonable" rate of return on their invested capital.

Historical Development

"The public utility concept is a modern legal creation, though it has some historical antecedents."⁴

Regulation can be traced back to the pre-Middle Ages era when churchmen established a near regulation of prices under the "just price" doctrine.⁵ Inherent in this system was the agreement that, like modern public utility rates, prices were established on the basis of what ought to be charged rather than on the dictates of the market.

The Mercantilist era provided further examples of government regulation. This period was characterized by government regulation designed to ensure that the interests of the state would be met by business activity. Monopolies were sanctioned but regulated in such a manner that hopefully most of the benefits would accrue to the state.

The development of strong unified states, the growth of population with its concentration in urban centres and the rapid changes experienced in the industrial structure and the economic conditions all contributed to the growth of the public utility sector and to the need for a formalized basis for regulation. One of the initial and most influential contributions made to this formalizing process was a commentary on the common law expounded by Matthew Hale, Lord Chief Justice of the King's Bench.⁶ His treatises, De Portibus Maris and De Jure Maris became the authority on the law of business "affected with a public interest". He felt that a service operated as a monopoly and providing a public service was affected with a public interest and ceased to be juris privati only. This essay by Lord Hale with its interpretation of common law became the basis for much of our present day regulatory direction.

The legal concept of a public utility was first advanced on our continent in the United States in a precedent setting pronouncement of the Supreme Court in 1877 when it handed down its decision on the Munn vs Illinois case.⁷ Since the American judiciary were abecedarians in the area of public law they based their decision on Lord Hale's essay of two hundred years earlier.

The Munn vs Illinois case arose when the State of Illinois passed a regulatory statute in 1871 which outlined the maximum rates that operators of grain storage facilities could charge. Several grain elevator operators charged fees in excess of those prescribed by the state legislature and they were fined. Munn, being one of

these operators, claimed that this action contravened the due process clause of the Fourteenth Amendment.⁸

What was actually at stake in this case was the interpretation given to the term "economic liberty". Under the liberal tradition, economic liberty was interpreted as opportunity. The opportunity to choose your own sellers and buyers; the opportunity to make a profit; and so on. It became quite obvious, however, that economic liberty could also mean the freedom to gain and exercise power. Previously property was not thought of as contributing to power, property was liberty. John Commons states:

But in the Munn Case, for the first time, it came to be seen that this liberty of private property meant also the economic power of private property.⁹

The Court applied Lord Hale's test to the grain elevator business and concluded that since it had assumed such immense proportions and since it was practically a monopoly, it was a business in which the whole public had a direct and positive interest.¹⁰ This case then became an extension of the law; an extension which became necessary through a new development of commercial progress. Following this pathbreaking case there came numerous cases which set the pattern for today's regulatory laws.¹¹

Thus the first type of regulation, developed out of experience and necessity, manifested itself in the form of court cases arising out of disputes based upon common-law obligations. Since the courts could act only on complaint, however, control by legislature became common. This type of regulation was also found wanting in that little

protection was provided since these laws were:

Unable to come to grips with the intricacies of public utility pricing, they offered no control over competition, and they were implemented by no other means of enforcement than suit in the courts.¹²

The task of governing utility operations came to be too onerous a task for the municipal authorities. Thus the franchise was introduced; it was essentially a permit for the public utility business to use municipal property in return for the performance of certain duties. Since the contract was binding it was very comprehensive in nature encompassing such aspects as rate schedules, monopoly grant, service standards and enforcement, cost classification, rate base, rate of return and depreciation charges. While definitely superior to direct municipal regulation, the franchise proved incapable of overcoming the complex problems that arose. Most public utilities operated simultaneously outside and inside the municipality with these outside operations not covered by the franchise. Thus control became rather meaningless and in some cases it retarded the possible expansion of firms into new areas.

The recognition that the above forms of regulation were inadequate led to the proposal that an independent body, concerned solely with the affairs, problems and conditions of the public utility, be commissioned to act as a regulatory body. Thus the regulatory commission was born. The commission, ideally free from political and commercial interests, promised greater success than previous methods since it was a semi-independent body endowed by the legislature,

giving it freedom to meet problems as they surfaced and in a position to deal with them effectively as this would be its only duty.

Canadian regulatory concepts seem to be patterned after the American experience.¹³ Government has simply legislated this control and precedent setting court cases are conspicuous by their absence. In Alberta, for example, public utilities are regulated under the Public Utilities Act which is enforced by the Public Utilities Board. It would appear, therefore, that in Canada we have had the benefit of seeing regulation develop in the courts of the United States and that we have legislated our regulatory methods, in both provincial and federal legislatures, accordingly.

Criteria for Delineating the Field of Regulation

The problem of attempting to distinguish between public utilities and non-public utilities has long been a perplexing one. For many years economists have attempted to crystallize the classification of a public utility by delineating characteristics common to all public utilities.

In the United States, legislators have legislated which enterprises require regulation and the Supreme Court has been the final arbitrator as to its legality. In Canada we have relied on legislators to exercise good judgement in their selection of which businesses ought to be regulated. We must recognize, however, that a public utility cannot be objectively identified as a thoroughly distinctive type of business. What then makes one business affected with the public interest and not another?

A layman will most often define a public utility by citing certain privileges and duties assigned to it. We must note, however, that with the passage of time the classification of a public utility and the mode of regulation has altered dramatically. A simple classification is impossible since these characteristics do not reveal themselves to us at an instant in time. It is possible, however, to point out several characteristics which appear to be common for all public utilities. Joe Bain extracts three major characteristics of regulated industries from the massive array of literature which considers this subject.¹⁴ The three are as follows:

1. The industry supplies a widely used consumer or commercial necessity for which there are no close or adequate substitutes available.
2. The technological conditions of supply are such that, in any market, either single-firm monopoly or concentrated oligopoly is inevitable or 'natural' in the sense that unrestricted competition would, in the light of scale economies or other considerations, engender the development of such monopoly or oligopoly.
3. The supply of service by more than one or a few regulated firms would be damaging to buyer interests because of technological conflicts.

Generally the first characteristic in addition to either, or both, of the latter furnish the accepted definition for the public utility concept and the raison d'etre for governmental intervention in the operation of the industry.

The Importance of Public Utilities in General in Canada

It is becoming increasingly apparent that public utilities play a major role in the economic development of an area. The nature

and the speed of economic development is intimately related to the availability, control and use of utilities such as electric power, natural gas, transportation and communication networks.

The total impact of utilities on economic development would have to be examined through the application of location theory and regional economic analysis. Input-output analysis¹⁵ of certain industrial complexes or the nation as a whole would provide further insight into the pervasive importance of the utility sector in the economy.

The importance of utilities in economic development is very much more than the contribution which they make to the gross national product; serving as catalysts, as well as essential ingredients, their role in economic growth is both qualitative as well as quantitative. The Canadian government recognizes this as evidenced during the most recent sitting of the House of Commons when they introduced a development plan whereby the federal government would provide funds to help improve various local utility services, transportation services and communication services so as to make the infra-structure attractive to industrial development.

Some indication of the relative importance of the utility sector in Canada in recent years may be gained from revenue and investment data relating to the period 1961-1966.

In 1966, the utility sector¹⁶ spent 2,831 million dollars on capital and repair expenditures in Canada. (See Appendix A.) This represented twenty per cent of all such expenditures in Canada, a

relative position that has traditionally been maintained with only slight variations over the six year period from 1961 to 1966. Thus an important portion of our investment dollar is sunk into projects regulated and controlled by government commissions.

When considering wages and salaries paid to employees of utility firms--486 million dollars in 1966--we note that the absolute figure is large but relatively it amounts to only 1.73 per cent of total wages and salaries paid in Canada. (See Appendix A.) During the six year period under review the wages and salaries in the utility sector hovered near two per cent of the Canadian total.

It is impossible to get a meaningful figure for the revenue generated by the utilities referred to above. If consideration, however, is limited to the electric power industry, gas distributing industry and telephone and telegraph industry it is possible to gain some insight into the enormity of these operations. In 1966 2.6 billion dollars (Gross National Product was 57.7 billion dollars) in revenue accrued to these particular industries. Thus their sales to ultimate consumers amounted to approximately 4.5 per cent of the Gross National Product in that year.

Importance of the Natural Gas Distributing Industry

In 1966 natural gas accounted for approximately 19.5 per cent of Canada's energy requirements and in addition, large volumes were delivered to markets in the United States.¹⁷ All of the provinces of Canada, except Prince Edward Island, Nova Scotia and Newfoundland, are now served by a rapidly growing network of gas pipelines and

distribution systems.

The natural gas distributing industry ranks very high in the industrial scene in terms of volume of production and total revenues collected. In 1966 Canadians purchased 635 million MCF¹⁸ of natural gas worth slightly over 416 million dollars. This amounted to \$261.81 per customer served. (See Appendix A.) When we consider that an expense of this type is incurred every year it is not difficult to understand the importance of the industry.

In Alberta, the natural gas distributing industry sold 185 million MCF of natural gas to approximately 263 thousand customers for 59 million dollars in 1966. (See Appendix A.) Average revenue per customer in that year amounted to \$226.15 and thus represented a substantial amount in a province where natural gas is, by comparison to other provinces, very inexpensive. The amount of gas sold represented 29 per cent of the total for Canada while the revenue collected was approximately 14.5 per cent of the Canadian total.

Technical Aspects of the Natural Gas Distributing Industry

General. Natural gas was first discovered and put to use long ago in the Orient. The Chinese have known about natural gas for centuries; in fact, the world's first pipelines were bamboo tubes which trapped and transported gas that seeped above the ground and used to heat brine in the making of salt. Other ancient civilizations are reported to have built temples over fissures in the earth where natural gas apparently was responsible for what they called everlasting

flames.

In the early 1800's natural gas was used as a source of energy but it was not until 1821, in Fredonia, New York, that the natural gas industry was really launched when a gas well was drilled. Natural gas was discovered in Alberta during the 1800's and in 1912 the sale of natural gas on a commercial basis got its beginning when Canadian Western Natural Gas Company (then under a slightly different name) began supplying natural gas to Calgary and Lethbridge.

The term natural gas is generally employed to describe the characteristic mixtures of gaseous minerals, including both hydrocarbon and non-hydrocarbon gases, which are found in subsurface rock reservoirs, often associated with liquid or crude petroleum. All the hydrocarbon gases in natural gas mixtures are inflammable, members of the paraffin series and have the general formula $C_n H_{2n+2}$. By far the most abundant component is methane (CH_4) which does not condense to a liquid under the temperature and pressure conditions of oil reservoirs and is thus always present in the gaseous phase, either in the form of free gas or dissolved in oil.¹⁹

In addition to the combustible hydrocarbons, there are usually variable proportions of several non-combustible gases in natural gas such as nitrogen, hydrogen sulphide and carbon dioxide. If these occur in large quantities then they must be removed by a treatment process before the natural gas is marketable.

Production. Obviously the first step in the production of natural gas is the drilling and completion of wells which is carried

on by numerous private operators. When a productive hole is found, casing and tubing is inserted into the well and this is connected at the wellhead to a 'Christmas Tree', which is an assembly of valves and fittings mounted at the head of the well to control the flow of gas. If distributors purchase directly from a producer then generally the price quoted is for natural gas at the 'Christmas Tree'.

The first step in getting the natural gas to the consumer is the completion of the well. If this gas well is in a fairly remote area away from existing pipelines then other wells must be completed in the field so that the combined deliverability and reserve make the installation of a gathering line from the main line economically feasible.

Transmission. Technological advances in pipe construction, methods of pipeline installation, purifying methods and compressor units have made possible the efficient transmission of natural gas through large and lengthy pipelines.

Natural gas that is gathered in the field requires treatment to remove impurities such as sulphur, propane, butane and gasoline. This process is necessary to protect transmission lines against corrosion and to make the gas marketable. This 'scrubbing' or cleaning may be accomplished by relatively small dehydration plants or by large, costly gas plants, depending upon the nature of the gas in the field.

As gas moves through a pipeline there is a substantial drop

in pressure, directly related to the diameter of the pipe, caused by the friction of the gas against the wall of the pipe. This is overcome by situating compressor stations along the pipeline. The calculation of optimum compressor station spacing involves an interesting economic balance between investment in larger diameter pipe or in additional compressor horsepower.

The exact nature of a transmission system depends upon a great number of considerations. The greatest impact is made by the character of the markets served, now and in the future. This includes such things as the load factor,²⁰ availability of storage for peak shaving²¹ and pressure at which the gas needs to be delivered. In addition the anticipated price of the gas to the pipeline must be known along with the pressure at which it is available. With these data it is possible to determine the optimum working pressure for the line, diameter and thickness of the pipe to be incorporated into the line, horsepower of compressors required, and the distance and spacing between compressor stations.²²

Distribution. Before entering the network of underground mains and pipes which characterize a distribution network system, the natural gas passes through regulator stations where it is metered and the pressure reduced. Gas often enters the city gate--regulator station--at pressure of up to 900 pounds per square inch and when it finally reaches the average household it is under only a few ounces of pressure. This final pressure depends, of course, on the nature of the consumer

as industrial concerns often require service at higher pressure than do commercial and residential users.

The amount of gas used fluctuates with the weather. A drop in temperature or an increase in wind velocity will reflect immediately in the amount of gas required. The staff charged with the responsibility of operating the regulator station equipment are thus required to make the necessary adjustments in the volume of gas flowing through.

The distribution company is responsible for the laying of mains and all service installations within their jurisdiction. Some of the larger gas distributors have their own construction and installation crews while some of the smaller firms contract this work out to firms specializing in that area. Finally the last responsibility of a technical nature is the installation of meters, internal piping and equipment which is done either directly by the gas company or by someone authorized by them.

Final considerations. The above analysis should leave the reader with the impression that the natural gas industry is divided into three distinct facets--production, transmission and distribution. It would be incorrect, however, to assume that the institutional structure is so neatly divided.

In Alberta there exist large gas distributors who own some of their own production facilities, transport some of their own natural gas and then distribute it. Meanwhile others act purely as distributors, obtaining their natural gas from large pipeline

transmission companies who may or may not own the gas that they are transporting.

The institutional structure of the natural gas industry is obviously rather complex. If one took the three major facets of the industry--production, transmission and distribution--and arranged them in every conceivable combination, taking either one, two or three at a time, it would be possible to find a company, or some branch of a company, in Alberta which would represent that situation.

FOOTNOTES

¹Ben W. Lewis, "Ambivalence in Public Policy Toward Regulated Industries," American Economic Review, No. 2, Vol. LIII (May, 1963), p. 40.

²P. J. Garfield and W. F. Lovejoy, Public Utility Economics (New Jersey: Prentice-Hall Inc., 1964), p. 1.

³The special right of eminent domain enables these companies to take private property for public use when necessary to the proper conduct of their business. The regulated industries are required to pay compensation for any property so taken.

⁴Emery Troxel, Economics of Public Utilities (New York: Rinehart & Co. Inc., 1947), p. 4.

⁵Garfield and Lovejoy, op. cit., p. 3.

⁶Comment on this and the following material is found in many books and articles. For example: Troxel, op. cit., p. 14; Garfield and Lovejoy, op. cit., pp. 4-5; I. R. Barnes, The Economics of Public Utility Regulation (New Jersey: F. S. Crofts & Co., 1942), pp. 2-13; B. D. McAllister, "Lord Hale and the Business Affected With a Public Interest," Harvard Law Review, Vol. 43 (March, 1930), pp. 759-791.

⁷Garfield and Lovejoy, op. cit., p. 6.

⁸The Fourteenth Amendment says that no state may deprive any person of life, liberty, or property without due process of the law. Munn claimed that by putting a maximum on his rates it reduced the yield on his property and thus reduced its value. Thus given that the property value was reduced it was the same as depriving a person of his property. The Court ruling rejected this allegation.

⁹John R. Commons, Legal Foundations of Capitalism (Madison: The University of Wisconsin Press, 1959), p. 32.

¹⁰Munn vs Illinois, 94 U. S. 113, p. 126, quoted in Garfield and Lovejoy, op. cit., p. 7.

¹¹During the years that followed the Munn decision the courts wrestled with the problem of what was meant by affected with a public interest. In Budd vs New York, 143 U. S. 517 the Court declared that the business of elevating, weighing and discharging grain from ships was affected with a public interest. A similar decision was reached for the fire insurance business in 1914 in German Alliance Insurance Company vs Kansas, 233 U. S. 389. In two other leading cases, however,

the Court rejected the regulatory concept. In Wolff Packing Company vs Court of Industrial Relations, 262 U. S. 522 (1923) the Court agreed that the State of Kansas acted unconstitutionally when it enacted a statute declaring that things such as food processing, manufacturing of clothing, etc., were affected with a public interest. Similarly in Tyson & Brother vs Banton, 273 U. S. 418 (1927) the Supreme Court decided that New York's attempt to control the sale of tickets to places of public amusement and entertainment was unconstitutional.

¹²Dudley F. Pegrum, Public Regulation of Business (Homewood: Richard D. Irwin, 1965), p. 642.

¹³Practically no information is available about regulation in Canada and a great deal of work needs to be done in this area.

¹⁴Joe Bain, Industrial Organization (New York: John Wiley and Sons, Inc., 1959), p. 590.

¹⁵See, for example, Dominion Bureau of Statistics, The Input-Output Structure of the Canadian Economy 1961 (Ottawa: Queen's Printer, 1969), D. B. S. #15 - 502.

¹⁶Industries classified by the Dominion Bureau of Statistics under the heading of utilities include electric power, gas distribution, railway transport, urban transit systems, water transport, grain elevators, telephones and telegraph, broadcasting and water systems. Of these electric power and telephones and telegraph are currently the largest contributors to capital and repair expenditures.

¹⁷Dominion Bureau of Statistics, Canada Year Book 1968 (Ottawa: Queen's Printer, 1968), p. 605.

¹⁸Thousand Cubic Feet.

¹⁹E. N. Tiratso, Natural Gas (London: Scientific Press Ltd., 1967), p. 4.

²⁰Load factor is the ratio of the average consumption to the maximum peak consumption during any one period of time. It thus measures the fullness of a utility plant use.

²¹Peak shaving is a term used to describe various methods employed by the industry to level out the curve of gas consumption versus time, and thus maintain the highest possible load factor in both transmission and distribution lines. If no such attempt were made, the load curve would show extremely high peaks in winter months, and low valleys in the summer months because of the variable nature of, and the large volumes consumed by, the space-heating market. This

levelling out can be done either by reducing demand for natural gas in peak periods (literally shaving the peaks); by filling in the low demand valleys by means of gas sales other than space-heating, or by temporary storage of the gas not immediately required, for later use.

²² Alfred M. Leeston, John A. Crichton and John C. Jacobs, The Dynamic Natural Gas Industry (Norman, Oklahoma: University of Oklahoma Press, 1963), pp. 77-78.

CHAPTER III

THE GROWTH AND STRUCTURE OF THE ALBERTA NATURAL GAS DISTRIBUTING INDUSTRY

Purpose

The purpose of this chapter is to examine the structure of the natural gas distributing industry in Alberta. It will begin by discussing the growth of the two dominant companies in the industry in Alberta, Canadian Western Natural Gas Company, Limited and its associate company Northwestern Utilities, Limited. An analysis of the current market structure will follow with emphasis given to the concepts of seller and buyer concentration. Finally it will consider the possible effects that the economies of scale have had in shaping the current market structure of the industry.

Canadian Western Natural Gas Company, Limited

Canadian Western Natural Gas Company, Limited was incorporated in 1911 and it acquired a very small natural gas distributing system which had already been established in Calgary. In 1912 a one hundred-seventy mile transmission line was constructed from Bow Island in Southern Alberta through Lethbridge to Calgary. The cities of Calgary and Lethbridge, along with a dozen small towns and villages between these two cities, were then supplied with natural gas.

During the next three and one half decades there was a slow but continuous expansion of services with several new communities

along its main pipeline added to its network of distribution systems. Most of the expansion during this period, however, resulted from the growth of the major centres of Calgary and Lethbridge.

In the 1949 annual report of the Company, management gave an indication of the direction the Company would take in ensuing years when it stated:

Apart from the continuing expansion of our existing system, the Company has for some time been interested in the possibility of serving a number of additional communities should they desire service.¹

True to their desire, the post World War II period was characterized by tremendous growth as the Company began to permeate most of Southern Alberta. Today the Company serves 91 communities, 128,843 customers and an approximate population of 504,000.²

In considering the growth of this company the author has chosen to restrict the period under consideration to the two decades from 1949 to 1969. The measures of growth used will be the number of cubic feet of natural gas sold per annum and the number of communities served at any given time. It would be a simple matter to provide information on the value of fixed assets, revenues and capitalization but these will not be presented as they do not indicate anything of importance from the standpoint of this thesis that has not been covered by the two measures mentioned earlier.

The number of communities served by the Company is the most interesting and revealing measure. It indicates the degree to which the Company has expanded beyond its original facilities. The institutional nature of the industry--granted monopoly control in particular,

well-defined areas--means that if an enterprise has been granted a natural monopoly in a city then it will grow as the city grows. This is only natural and not particularly revealing. Of interest, however, is the expansion into new markets revealed by the growth in the number of franchises served by the enterprise.

The number of communities served will be reported in total and then classified as either major centres³ served or minor centres⁴ served. This will indicate the type of expansion undertaken by the Company.

In 1949 the Company served two major centres, Calgary and Lethbridge, along with seventeen minor centres, all, with the exception of Brooks, situated on or near the Company's major transmission

Table 1

GROWTH OF CANADIAN WESTERN NATURAL GAS COMPANY, LIMITED

Year	Communities Served			Change	MCF of Gas Sold	Index of MCF Sold
	Major	Minor	Total			
1949	2	17	19		20,882,000	100
1951	2	22	24	+5	26,632,000	127
1953	2	25	27	+3	28,313,000	135
1955	2	34	36	+9	34,436,000	164
1957	2	45	47	+11	37,601,000	180
1959	2	61	63	+16	41,621,000	199
1961	2	78	80	+17	44,276,000	212
1963	2	80	82	+2	47,831,000	229
1965	2	81	83	+1	58,012,000	277
1967	2	86	88	+5	62,954,000	301
1969	2	89	91	+3	71,430,000	342

Source: Gathered from selected annual reports published by Canadian Western Natural Gas Company, Limited.

line from Bow Island. During the next two years it completed a pipeline from a gas field west of Calgary and provided natural gas to such communities as Banff, Cochrane and Canmore. During the period 1953 to 1955 it installed a major pipeline south of Lethbridge and connected towns in the Cardston, Raymond and Magrath area.

The next decade saw the Company complete several major pipeline networks and embark upon a rapid expansion in the installation of individual distribution systems in communities where the natural gas is purchased from transmission companies. Today, of the ninety-one companies that the Company serves, thirty receive their gas from transmission companies and Canadian Western Natural Gas is the distributor. With only few exceptions, all of these franchises were garnered in the past fifteen years.

While the increase of seventy-two communities served in two decades is in itself most impressive it somewhat understates the situation as a number of communities--Bowness, Montgomery, Midnapore and Forest Lawn--formerly independent towns, are now amalgamated with the City of Calgary.

The growth of 242 per cent in the sales of natural gas reflects both the growing size of the Company network and the increased utilization of the product. The cities of Lethbridge and Calgary have grown rapidly, dozens of communities have been added to the system and many new uses have been discovered for natural gas. Thus the growth in sales is self-explanatory.

Northwestern Utilities, Limited

Northwestern was incorporated under Dominion laws in 1923 and thereafter supplied Edmonton consumers with natural gas from the Viking-Kinsella field. Northwestern grew rather slowly for several decades with growth limited almost exclusively to existing franchises but in the 1940's the Company embarked upon a long and sustained pattern of growth. Expansion was not simply limited to towns along the transmission line from the Viking-Kinsella field to Edmonton, rather almost the entire populated area of central Alberta from Red Deer north came to be served by this Company. Today it services 113 communities with 135,299 customers⁵ as various new transmission lines have been added and it has also recently established distribution networks in a number of communities where the natural gas is supplied by major transmission companies.

The measures of growth used will be the ones established in the previous section dealing with Canadian Western Natural Gas Company, Limited.

In 1949 Northwestern Utilities served fifteen communities; four major centers and eleven minor centres. Its basic system was virtually unchanged from the original one taken over in 1923. During the period 1949 to 1955, however, it built several transmission lines in the vicinity surrounding Edmonton City and distribution systems were installed in numerous centres.

Table 2

GROWTH OF NORTHWESTERN UTILITIES, LIMITED

Year	Communities Served			Change	MCF of Gas Sold	Index of MCF Sold
	Major	Minor	Total			
1949	4	11	15		14,499,000	100
1951	4	22	26	+11	24,002,000	165
1953	4	27	31	+5	27,500,000	189
1955	4	28	32	+1	39,594,000	273
1957	4	53	57	+25	46,226,000	318
1959	4	66	70	+13	54,984,000	379
1961	4	71	75	+5	53,988,000	373
1963	4	75	79	+4	63,599,000	440
1965	4	81	85	+6	75,362,000	519
1967	4	99	103	+18	86,280,000	595
1969	4	109	113	+10	96,334,000	664

Source: Gathered from selected annual reports published by Northwestern Utilities Limited.

The decade following 1955 saw the Company bid for and gain dozens of franchises in small villages and towns on or near large gas transmission pipelines. In these centres the Company acts only as a distributor as all of the natural gas supply is purchased from transmission companies.

The growth in sales of natural gas by the Company has been very impressive. Sales have increased by 564 per cent during the two decades following 1949. A tremendous increase in population and a vigorous pursuit of new franchises has been dominantly responsible for this outstanding growth in sales.

Market Structure of the Alberta Natural Gas Distributing Industry

Market structure refers to the organizational characteristics of the market which influence strategically the nature of competition and pricing within the market. In our regulated industry these characteristics would seem to be meaningless because the nature of competition and pricing procedures are regulated. It is important, however, to get an indication of the structure in order to be in a position to fully understand the actual control which regulatory bodies can maintain.

The industry will be analyzed according to the characteristics which Joe Bain emphasizes as being the strategic aspects of market structure.⁶ They are as follows: (i) The degree of seller concentration; (ii) The degree of buyer concentration; (iii) The degree of product differentiation; and (iv) The condition of entry into the market.

Consideration of product differentiation will be dealt with quickly since it is of little importance in the natural gas distributing industry. The nature of the product that is delivered to the ultimate consumer is closely controlled by strict technical standards and while differences occur in the B.t.u. output of gas from certain areas, these variations are not large enough to make a significant impact when considering alternative distributors.

Seller concentration. The concept of seller concentration, generally referred to as the number and size of firms producing a particular output in a particular market, faces several anomalies

when applied to a regulated public utility. Seller concentration is generally analyzed within a well-defined market. In the natural gas distributing industry in Alberta, each distributor has monopoly control over all areas in which that enterprise has a franchise.

In effect, therefore, there are hundreds of individual markets, each served by one distributor and thus the usual measure of seller concentration would appear to be of limited value.

In this paper the entire province of Alberta will be taken as the geographical market under consideration. While there is no competition between gas distributors in areas where franchises are in effect there is considerable competition for new franchises. The measure of seller concentration may give some indication of the possible effectiveness of this competition. Of greater importance, however, is the need to analyze seller concentration so as to judge the power with which the utility companies face the Board or alternatively judge the ability of the Board to effectively control the utility companies.

The Oil and Gas Conservation Board of Alberta lists seventy-one gas distributors in Alberta as of December 31, 1969.⁷ Thus on the surface it would appear that the degree of seller concentration is relatively low. Seller concentration, however, refers in general to both the number and relative size of the units which control a given economic aggregate. Thus it is usual to devise a measure which combines both, that is, the percentages of sales controlled by various given absolute numbers of control units. The absolute numbers chosen

is based upon an "educated guess" of what groupings will best explain the situation.

The definition of a 'control unit' presents several conceptual problems. In attempting to ascertain the degree of concentration of control over all enterprise wealth or activity, each control unit should be recognized as separate and independent of others, and separately counted only if no other unit can in turn legally or actually control it.⁸ It is difficult to clearly define control when we view several companies within Alberta. The International Utilities Corporation, incorporated in Maryland in 1924, and which became a resident Canadian corporation in 1961, owns all of the common stock of Northwestern Utilities (largest gas distributor in Alberta), about nine-tenths of the common stock of Canadian Western Natural Gas Company Limited (second largest gas distributor in Alberta), and nearly all of the stock of Northland Utilities (third largest gas distributor in Alberta).⁹ Thus we have three separate corporations operating in Alberta which are legal but not necessarily economic entities. These three companies do not compete in any way, they operate as associate companies with interlocking directors and management, and thus must be considered as one control unit. Thus a control unit will be defined as all those assets subject to the same ultimate source of control.

Table 3

MEASURE OF CONCENTRATION

Percentage of 1966 sales in the industry:		Alberta Natural Gas Distributing Industry
Controlled by the largest control unit		84.6
Controlled by the 2 largest control units		87.0
Controlled by the 4 largest control units		89.4
Controlled by the 6 largest control units		89.7

Sources: Dominion Bureau of Statistics, Gas Utilities (Ottawa: Queen's Printer, 1961-1966), D. B. S. #57 - 205. Individual sales figures were obtained from individual firms.

The measure as presented indicates a very high degree of seller concentration in the natural gas distributing industry in Alberta.

One control unit alone controls an overwhelming 84.6 per cent of the natural gas sales and by any reasonable interpretation this approaches monopoly conditions.

With this type of concentration it becomes obvious that the only enterprise the Board will face in major rate hearings will be International Utilities. As a result the Board is not in a position to draw on diverse experience when rendering decisions. The possibility of comparing costs, standards of service, and investment procedures is virtually non-existent. Thus the Board is in the unenviable position of facing a large, powerful enterprise without the benefit of a competitive comparison on which to base its decisions.

Buyer concentration. Consideration of buyer concentration presents a number of conceptual difficulties with the major difficulty being the manner in which a buyer will be delineated. Should each customer serviced by a gas utility be considered a unit buyer or should these customers be subdivided into residential, industrial and commercial buyers? These divisions can be defined according to Dominion Bureau of Statistics categories:

- (a) Residential - Sales of gas at residential rates for residential use including house heating, cooking, water heating, etc.
- (b) Commercial - Sales of gas at commercial rates to hotels, restaurant, department stores, retail dealers, etc.
- (c) Industrial - Sales of gas at industrial rates, mainly to industrial and manufacturing concerns such as manufacturers of chemicals, machinery, textiles, food stuffs, foundries and machine shops. These sales include the sales of natural gas for heating purposes as well as raw materials for manufacturing processes. Certain very large commercial establishments such as large hotels or department stores may be included in this category.¹⁰

Alternatively it may be more revealing to consider each community served as being a unit buyer and consider only the total supply purchased by the entire community. The latter would seem to be most appropriate since individual customers are generally represented at regulatory hearings by the community in which they reside. Exceptions, however, do occur in the case of large individual consumers (generally industrial firms) thus any measure of buyer concentration based solely on communities served would also be found wanting. The conclusion is that no

single measure would appear adequate and consequently a number of facts will be presented which are designed to give a general picture of buyer concentration in the natural gas distributing industry in Alberta.

In 1966, the most recent year for which accurate figures are available, there were 263,391 individual customers of natural gas in Alberta.¹¹ This can further be divided into 236,331 residential consumers, 26,424 commercial consumers and 636 industrial consumers. It would be useful to construct a measure to indicate buyer concentration similar to the one employed for indicating seller concentration but data are not readily available for the purchases made by individual consumers.

Since the vast majority of consumers obtain their natural gas under franchise agreements negotiated for the entire community it may be useful to consider the number of communities served as being a measure of the number of buyers of the service. Again data are not readily available for the total number of separate communities served and revenues gained from these by the total gas distributing industry in Alberta but a general picture can be obtained by looking at the situation faced by one major firm--Northwestern Utilities Limited. In 1966 Northwestern served 92 communities including the major centre of Edmonton. The City of Edmonton, which under this analysis is taken as one buyer, purchased 62 per cent of the total gas distributed by Northwestern in that year.¹²

From this information it would appear that Northwestern faced

a large and powerful buyer. Most other natural gas distributing firms in Alberta face a situation somewhat similar to the one faced by Northwestern. Canadian Western Natural Gas, for example, serves a major buyer--the City of Calgary--while many small utility companies serve one, two or a limited number of communities. If the communities truly reflect the wishes of individual consumers then one must conclude from this analysis that buyer concentration is high in the natural gas distributing industry in Alberta. Yet it is dangerous to conclude that a community composed of many consumers will act with the forcefulness and effectiveness of a single consumer, for example a major industrial concern, which presents a similar demand situation. Consequently the actual power resulting from this relatively high community buyer concentration may be somewhat diluted. It may be useful at this time, therefore, to consider the manner in which communities bargain with the utility companies.

When a utility company begins to serve a community it does so under a franchise granted by the community for a specified period of time, generally 10 or 20 years. In most franchise agreements there is a clause which allows the community to take over the system at the end of the agreement period if the community so desires. The actual value of the system would be determined by arbitration and the application for a takeover would come before the Public Utilities Board in the first instance, and to the courts in the event of appeal. Consequently if a community is dissatisfied with the rates or the service as provided by the utility company it can refuse to renew the franchise when

it expires.

During the period of the agreement the community may negotiate with the utility company over, for example, rate structures but it is not in a position of strength. If the utility company applies to the Board for a rate increase, the community, or communities, concerned can make representation before the Board and appeal for special considerations. Other than that course of action the communities have no course open to them and they must rely on the Board to protect their interests.

The market structure of the natural gas distributing industry in Alberta is characterized by a near monopolist facing numerous, relatively weak, consumers whose welfare is supposedly protected by the regulatory powers of the Public Utilities Board.

Economies of Scale

Regulation is often predicated on the idea that an enterprise can achieve a lower unit cost of operation if placed in a position of monopolist in a market. This argument is based on the concept of economies of scale.

Economies of scale refer to the increased efficiency or lower unit costs of production that are realized from the expansion in the size of the operation of the enterprise.¹³ The question arises, therefore, whether the market structure of the natural gas distributing industry in Alberta can be explained by the existence of significant economies of scale.

It is generally conceded that there are three principal reasons for the economies of scale.¹⁴ First, economies of scale are directly related to the size of the market. If an enterprise is serving a small, given market economically then it will operate with a plant of optimal size for that market. If the market expands, or there is an increased demand for its product in the market, the firm will increase its productive capacity and costs per unit of output may decrease as the increased size may result in economies of scale.

Second, economies of scale may result from the indivisibility of certain factors of production. For example, large gas pipelines--within certain limits--are cheaper to obtain per unit of output than are smaller pipelines. Therefore larger outputs can be obtained at lower costs per unit of output. Phillips notes an example of this type:

Unit costs of crude oil pipeline transport decline rapidly with increases in designated capacity per day and the diameter of the pipeline. Thus, a throughput of 25,000 barrels per day in a 10.75 inch line costs 0.237 cents per ton-mile as compared with a cost of 0.0513 cents per ton-mile for a daily throughput of 400,000 barrels in a 32 inch line.¹⁵

Indivisibilities may also apply to labor and management.¹⁶ Many utility operations require few employees and often a large operation can operate efficiently with nearly the same number of employees as a small operation.

Third, increased specialization in the use of factors of production may also result in unit costs decreasing as the scale of operation is increased. Specialization in processes, techniques, and responsibilities may arise due to large size and this may enhance the efficiency of the operation thereby further decreasing unit costs.

Attention must now be focused on the industry. As pointed out earlier, the structure of the natural gas distributing industry in Alberta is characterized by distributing systems in two large centres, Calgary and Edmonton, systems in numerous smaller centres tied together by a complex pipeline network owned by the distributing companies and systems in dozens of small communities supplied by transmission pipeline companies. In considering the role of economies of scale in the shaping of the natural gas distributing industry the author will analyze the problem from two viewpoints; the distributor with an individual system and the distributor with a large network of systems.

It would appear that all of the usually accepted principles of economies of scale apply, at least to some degree, to an individual distribution system. Increased size seems to result in reduced per unit costs. The history of gas rates in Alberta, up until the mid-fifties, was one of almost continuous reduction in rates. This may partly be attributable to improved technology at all three levels of the natural gas industry and partly to efficiencies created by economies of scale which were created when the demand for natural gas increased as population and the use of natural gas rose appreciably. Generally existing pipelines were utilized more efficiently, larger mains resulting in lower per unit costs were installed and service became more dependable and safe.

The question must now be asked, what is the optimal scale of operation for a natural gas distributor and how important is it that this scale be reached? The author is not aware of any studies that

have been done in this area and since it is not the purpose of this paper to resolve this problem the discussion will be limited to a general analysis of the situation.

The optimal scale of operation would depend mainly on the nature of the market, now and in the future. The optimum size of a distribution system would depend, among other things, upon the severity of the climatic conditions, type of consumer serviced and the growth pattern of the market.

The range of temperatures experienced in an area would have a strong bearing on the optimal size of a system. Large variations in temperature would result in a low load factor, or high average excess capacity, since demand on the coldest day would be very much greater than demand on the warmest day. Given the complex nature of pipeline dynamics and related aspects, it becomes obvious that the most efficient scale of operation will depend partly on the weather.

The problem of servicing peak demand presents itself again when considering the type of consumer served. If a market is almost totally composed of residential consumers then the optimal scale of operation will be different from one required to service an area composed of some commercial and industrial purchasers who, by their relatively constant purchases, would 'smooth out the peaks'.

Finally the pattern of growth experienced in a market will also have a major bearing on the optimal size of the system. Varying combinations of slow growth, rapid growth; concentrated growth, urban sprawl growth; and residential growth, commercial and industrial growth

will have varying impacts on the optimal scale of operation.

Direct empirical investigation of scale curves is in itself a very complex and controversy filled exercise without introducing the problems referred to above. The author, in an attempt to say something conclusive in this area, considered using the difference between the retail price of natural gas and the cost of the gas to the distributor as an indication of the cost of distribution. This figure would be calculated for several different sizes of distributor and inferences, based upon this information, made concerning the optimum scale of operations.

It was found, however, that to argue from price minus cost data for firms of various sizes it was necessary to make so many unsupported assumptions that the result was to vitiate any attempt to infer scale curves. The selling price of natural gas is a function of many variables. The cost of natural gas, transportation costs (pipeline transmission costs), age and condition of the system, composition of the soil, load factor, which itself is a function of climatic conditions and type of consumer served, and profit rates, which in municipally owned systems are not necessarily regulated and are used as a method of taxation, all have some bearing on the final price of the natural gas. Variables such as age and condition of the system, composition of the soil and load factor are engineering estimates and are generally not available so assumptions concerning their effect would have to be made thereby rendering any analysis worthless.

Consideration will now be given to the importance of operating at the optimal scale. If the costs per unit of supplying natural gas increase dramatically below the optimal scale then, of course, it is very important that the system be near optimal size. If, however, unit costs rise only slightly above those experienced at optimal output when output is decreased then the importance of this aspect is decreased markedly. Figure one presents a long-run cost curve for a hypothetical natural gas distributing system. It is obvious that

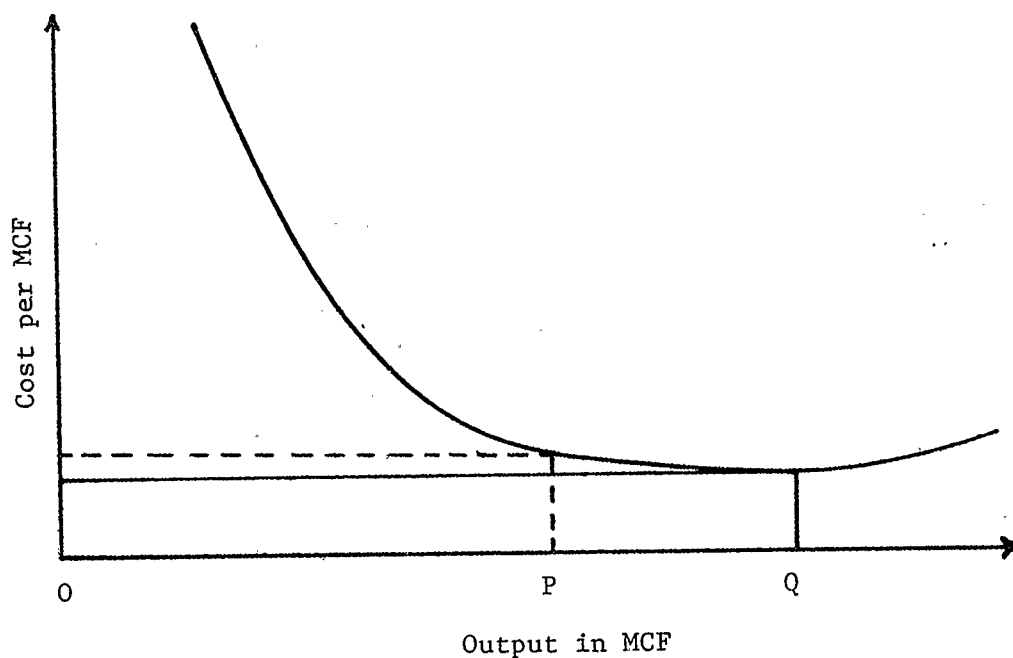


Figure 1

LONG-RUN COST CURVE OF A HYPOTHETICAL
NATURAL GAS DISTRIBUTION SYSTEM

under these conditions there would be no burdensome cost disadvantage for firms distributing as little as OP MCF of natural gas. Below output OP, however, the unit costs begin to soar and distribution would be very inefficient. Thus output is not very important if costs rise only slowly when output decreases.

Without the benefit of the empirical investigation referred to earlier, it would appear that size of operation is not tremendously important when considering individual distributing systems. In Alberta there exist such diverse individual systems as the large (nearly one and one-half million dollars in annual revenue) municipally owned system in the City of Medicine Hat and the tiny (fifty thousand dollars in annual revenue) privately owned system of Redwater Utilities, Limited in Redwater, Alberta. Many of these small systems are in areas where there is not likely to be much growth in the future thus consideration of economies of scale as applied to them per se is rather futile. What is of greater interest, however, is the relationship of these individual systems to the large integrated distribution networks and possible economies gained by entering one of these networks. We will now turn our attention to the consideration of this aspect.

Upon consideration of the growth of the International Utilities' system in Alberta and the resulting market structure, one might immediately assume that the industry has developed this way since the firms in question were taking advantage of economies of scale. A number of anomalies within the industry, however, suggest that this may not be so. Within the industry in Alberta there exist a number of municipally

owned firms and privately owned firms, small in comparison to International Utilities, Limited, which operate franchises and seem to do so quite successfully. If we assume the consumers, or consumer representatives, act rationally then they will grant their franchise to the control unit which can supply the natural gas at the lowest possible price. Hence, the existence of these small distributors which serve communities very similar to dozens served by the large distributors, greatly weakens the economies of scale argument.

Recalling the growth of the two major companies, it would seem realistic to assume that given that they owned the two major transmission lines in the province they would experience economies of scale, for their overall system, by increasing the utilization of these lines. When viewing the expansion of their network and finally their expansion into numerous individual systems, however, it becomes increasingly difficult to attribute this expansion to economies of scale. Since the majority of this latter expansion was 'independent' of their main networks it would seem unlikely that per unit costs, for the entire system, could be lowered by increasing output. There is the one possibility that economies of scale were realized in the labor sector of the operation. The possession of highly efficient management, skilled technicians, large research departments and personnel management services may have made it economical for the firms to expand to a scale of operation which enabled them to utilize this manpower effectively. Manpower costs are such a negligible part of the entire operation, however, that this possibility may be somewhat exaggerated.

The views of three experts connected with the industry.

Mr. B. W. Snyder, rate engineer for Canadian Western Natural Gas, expressed the opinion that economies of scale were very important in the natural gas distributing industry.¹⁷ He felt that size certainly had a major bearing on the growth of the International Utilities' companies. He asserted that the share of the system's operating expenses, assigned for any particular operation is very much lower than that on which that community or company could operate on its own. This is so because International Utilities assign no specific expense to operations of a particular town, just a share of the pool of expenses. Thus each centre in effect pays for some small share of the total management expenses but the share is very minimal and in his opinion these centres could never provide their own effective management at these costs. He further contended that the International Utilities network can operate with a minimum of men in these centres for the day to day functions of the system. In the event of an emergency situation they can pull men from their pool of trained personnel who can get there very quickly to cope with the situation. Thus in the final analysis he felt they can get by with a minimum of operating costs. He maintained that a share of the overhead costs of a large operation for a particular centre inevitably is found to be very much less than the cost of operating it as a small independent system.

While Mr. Snyder did not cite any examples or give any details he claimed that their companies had seen evidence of the above in

properties that they acquired which were formerly operated as separate units. International Utilities' share of assigned operating expenses was very much less than the costs that the systems had incurred before.

Finally Mr. Snyder attributed the advantage, and thus the growth, of International Utilities to the scale of their purchases whereby they buy pipe and equipment in massive quantities and thus reduce unit costs since more favorable prices are available to them.

Summarizing Mr. Snyder's arguments, he implicitly suggested that International Utilities has been operating on the downward side of their cost curve and that the scale of operations is extremely important in the gas distributing industry. He claimed that they have cost advantages, management advantages and service advantages which make it only natural that they have come to dominate the Alberta gas distributing industry.

His argument is not very conclusive in that while the ability to spread management costs over a large system may make it possible for them to reduce overhead costs in certain areas it does not mean that average overhead costs are lower for the entire system. Overhead costs may indeed be higher than necessary in the large centres thus negating the argument that large scale operations reduce per unit costs.

Mr. S. W. Armstrong, Vice-President of a small gas distributing company, while agreeing with Mr. Snyder on many points, disagreed on some vital issues.¹⁸ His view was that bigness did not present any significant cost advantages. Small independent gas distributing companies can contract out much of their work and it is not necessary

to have a large installation and maintenance crew. Furthermore, bulk buying, according to Mr. Armstrong, does not yield any particular advantages. Two companies, one large and one small, when bidding on a particular franchise will generally present estimates for installation costs which are not significantly different.

Commenting on the advantages that the large International Utilities' companies do have, Mr. Armstrong attributed it to effective management, excellent service and the ability to spread management costs over a giant network. He agreed with Mr. Snyder that an International Utilities' company could provide superior service at minimal costs since it need only call on its large pool of resource personnel.

In closing, Mr. Armstrong rationalized the growth of the gas distributing industry in rather conciliatory tones. The growth of the two companies which gained franchises in Edmonton and Calgary was inevitable. As these centres grew so did the companies serving them and as the companies grew they were able to expand into new markets, provide additional services and influence greater numbers of people. The conjecture implicit in this argument is that the dominance of several gas distributing firms in Alberta was unavoidable.

The views expressed up to this point were sharply rejected by Mr. Flavin, member of a local engineering consulting firm.¹⁹

Mr. Flavin agreed that the services provided by the major distributors were excellent. He did, however, question their overall necessity and value. He suggested that many of the services were rather useless, tremendously costly and designed primarily to enhance

the public image of the company concerned. The public may indeed be better off if they were denied these 'extra' services and provided natural gas at cheaper per unit prices.

Mr. Flavin totally disagreed with the contention that the major distributors have lower per unit overhead costs. His feeling was that when large companies engage in providing the services discussed earlier, spending huge amounts on public relations and periodically engaging in lengthy and costly rate hearings it creates a situation where the share of overhead costs that any small area would have to carry would be larger than if a small independent company or municipality provided the gas.

In conclusion, Mr. Flavin did not agree with the conjecture that the manner in which the gas distributing industry in Alberta grew was inevitable. He maintained that small independent systems, and particularly municipal-owned ones, could operate very competitively.

Comparison of distribution costs. While any empirical evidence presented will suffer from the weaknesses pointed out earlier it is the intention of the author to cite several examples which cast some doubt on the importance of economies of scale in a large integrated distribution network.

Numerous companies were contacted and requests were made for rate schedules and costs of natural gas to the distributor. Most supplied rate schedules but few would supply the information dealing with the costs of natural gas. With the information available,

however, some interesting comparisons can be made. Several areas were chosen where either Canadian Western Natural Gas or Northwestern Utilities had franchises in close proximity, or with similar conditions, to other gas distributors. Differences between average price and costs were calculated for several levels of gas purchases with analysis restricted to the small purchaser. This difference should indicate the cost of distributing the gas in that particular area. If economies of scale are extremely important then we assume that the cost of distributing natural gas should be less for the major distributors than for the smaller distributors.

In central Alberta, Plains-Western Gas and Electric Company, Limited, who supplied approximately 2.4 per cent of the Alberta gas market in 1968, has entered into direct competition with Canadian Western Natural Gas for several franchises in the past several decades and have obtained a number of these franchises. One such franchise is in Stettler where it obtains gas for 11 cents per MCF and sells it according to the following schedule:

First	2 MCF per month	\$2.50
Next	28 MCF per month	.53 per MCF
Next	70 MCF per month	.51 per MCF

For a basis of comparison two franchises operated by International Utilities' companies were chosen. One operated by Canadian Western at Big Valley is in the vicinity of Stettler and the other, operated by Northwestern Utilities, is in the community of Hinton which has a population almost equal to Stettler.

For the Big Valley franchise, Canadian Western purchases its natural gas at 17.1 cents per MCF and sells it according to the following schedule:

First 2 MCF per month	\$3.25
All additional MCF per month	.67 per MCF

Northwestern pays a tremendously high rate for the gas required to serve the Hinton franchise. The cost is 30.5 cents per MCF and the rate schedule is as follows:

First 2 MCF per month	\$3.00
All additional MCF per month	.69 per MCF

In Table 4 the cost of gas to the distributor is given along with the average price per MCF if the consumer purchases 10 MCF, 30 MCF or 50 MCF per month. Data on the cost of gas were obtained from the firms in question while the average prices facing the consumer were calculated from the rate schedules. With these two values known it was a simple matter of subtraction to find the cost of distributing the gas in these particular centres.

In all of the cases cited the cost of distributing the natural gas decreases as the consumer purchases more. This agrees with our earlier contention that within an individual system the cost per unit of output will decrease as output increases. At this time, however, we are interested in cost advantages that a huge concern such as International Utilities may have in Alberta over Plains-Western. When comparing the franchises in Stettler and Big Valley we note that Plains-Western has significant cost advantages. As the populations of Stettler and Big Valley are rather dissimilar the comparison

Table 4
COMPARISON OF DISTRIBUTION COSTS
IN THREE DIFFERENT FRANCHISES
(Stettler, Big Valley, Hinton)

Company	Plains-Western	International Utilities	
		Canadian Western	Northwestern
Community	Stettler	Big Valley	Hinton
Population	4000	400	4300
Cost of Gas to Distributor	11¢ per MCF	17.1¢ per MCF	30.5¢ per MCF
Average Price per MCF if Consumer			
Purchases: 10 MCF	67.4¢	86.1¢	85.2¢
30 MCF	57.8¢	73.4¢	74.4¢
50 MCF	55.1¢	70.8¢	72.3¢
Cost of Distribution per MCF if Consumer			
Purchases: 10 MCF	56.4¢	69.0¢	54.7¢
30 MCF	46.8¢	56.3¢	43.9¢
50 MCF	44.1¢	53.7¢	41.8¢

Sources: Data obtained from the companies involved.

is surely unfair to Canadian Western. It may be significant that when two towns of more nearly equal size are compared (Stettler and Hinton) the large firm and the small firm face very similar costs and the lower costs are in fact experienced by the larger firm but they are in the slightly larger town. It is this comparison that may

suggest that the size of the distributor is in itself not too important. We may speculate that the cost differences for Big Valley should be considerably smaller and those for Hinton significantly larger if there are any cost advantages in being part of a large system. A fuller discussion of this possibility will be presented in a later chapter.

Table 5
COMPARISON OF DISTRIBUTION COSTS
IN TWO DIFFERENT FRANCHISES
(Pincher Creek, Blairmore)

Company	Plains-Western	Canadian Western
Community	Pincher Creek	Blairmore
Population	2800	2000
Cost of Gas to Distributor	17.33¢ per MCF	19.8¢ per MCF
Average Price per MCF if Consumer Purchases: 10 MCF	63.4¢	69.2¢
30 MCF	53.1¢	55.7¢
50 MCF	51.1¢	53.0¢
Cost of Distribution per MCF if Consumer Purchases: 10 MCF	46.1¢	49.4¢
30 MCF	35.8¢	35.9¢
50 MCF	33.8¢	33.2¢

Sources: Data obtained from the companies involved.

Another area where a comparison may have some validity is in South-western Alberta where Plains-Western operates a franchise in Pincher Creek while Canadian Western operates a franchise in the nearby community of Blairmore. The rate schedule in Pincher Creek is \$2.50 per month for the first two MCF and 48 cents per month per MCF for any additional units while in Blairmore the rate schedule is \$3.00 per month for the first two MCF and 49 cents per month per MCF over the initial two. Table 5 indicates the cost of gas to the distributor, average price per MCF to the consumer and the distribution costs per MCF.

While it would be foolish to attempt to draw any definite conclusions from the data contained in Tables 4 and 5 it would seem that any advantage that may result from being part of a huge network of distribution systems does not readily reveal itself. The cost advantage in every case cited is in the larger town indicating that it is this, not the size of the distributor, that may be important. The high cost of gas to the larger firms may simply be an indication of a high well-head price and in no way proves that they have no advantages in bargaining power. All of this leads to the conclusion that the evidence as cited here does not indicate any marked superiority or inferiority of the larger firms over the smaller firms in the costs of distribution.

Another interesting situation exists in the City of Medicine Hat where the city operates its own natural gas system and while it is a fairly large individual system it is a pygmy compared to the giant International Utilities' companies. The citizens of Medicine Hat obtain their natural gas cheaper than natural gas can be obtained in

any other city in Canada. The system is not subsidized, in fact in 1968 the net profit from the gas utility that was turned over to the city and which was used for the relief of taxation was nearly one half million dollars. Without data on the cost of gas to the system a definite conclusion can not be drawn but it further suggests that a system need not be extremely large to be efficient and low-cost.

The question of whether economies of scale have had a profound effect on the manner in which the natural gas distributing industry developed in Alberta could only be answered by an exhaustive analysis of production costs in the industry. The fragments of information that have been presented, however, cast serious doubts on the contention that the major companies enjoy cost advantages not available to smaller companies.

It appears obvious, given the nature of pipeline and compressor dynamics, that an individual system can enjoy the benefits of economies of scale as its output increases. The optimal size of such a system has unfortunately not been determined and thus it is impossible to conclude whether individual systems in Alberta are operating near peak efficiency or not. But there is undoubtedly some range of output within which unit costs decrease as output increases. The author will further concede that economies of scale may also make it advantageous for a distribution firm that owns its own transmission line to establish franchises along this line so as to fully utilize the pipeline.

It appears doubtful that significant economies of scale are achieved as a distribution enterprise extends into new areas with new

transmission lines and new individual distribution systems. The only plausible advantages would appear to be in the ability to spread fairly constant labor costs over a larger system and in the ease of attracting funds. Since labor costs represent a small portion of a gas utility's operation it is doubtful if this had a major impact on the growth of the industry in Alberta. The financial advantages of size can not be denied but at the same time it would be unwise to attribute International Utilities' position in Alberta to its ability to raise funds for capital expenditure.

The discussion to this point has been designed to give the reader an insight into the nature and structure of the natural gas distributing industry. The major purpose of this thesis is the broader one of discussing the general theoretical principles applicable to utility companies, examining closely and critically the actual regulatory practices as they apply to the industry under study in Alberta, and investigating and pointing out areas of possible concern. Chapter IV will deal with these areas in detail.

FOOTNOTES

¹Canadian Western Natural Gas Company, Limited, 38th Annual Report 1949 (Calgary: Canadian Western Natural Gas, 1949), p. 3.

²Canadian Western Natural Gas Company, Limited, 58th Annual Report 1969 (Calgary: Canadian Western Natural Gas, 1969), p. 2.

³Major centres will be taken as all those communities called cities in the Alberta Bureau of Statistics census of 1966. These include Calgary, Camrose, Drumheller, Edmonton, Grande Prairie, Lethbridge, Medicine Hat, Red Deer and Wetaskiwin.

⁴Minor centres will be taken as all those communities not called cities in the Alberta Bureau of Statistics census of 1966.

⁵Northwestern Utilities, Limited, 46th Annual Report 1969 (Edmonton: Northwestern Utilities, 1969), p. 2.

⁶Joe Bain, Industrial Organization (New York: John Wiley and Sons, Inc., 1959), p. 8.

⁷Revealed in a letter received from Mr. Warne, Assistant Manager of Gas Department, Oil and Gas Conservation Board, January 29, 1970.

⁸Joe Bain, op. cit., p. 90.

⁹Eric J. Hanson and others, Special Gas Study Report for the City of Edmonton (Edmonton: City of Edmonton, 1965), p. 31.

¹⁰Dominion Bureau of Statistics, Gas Utilities (Ottawa: Queen's Printer, 1966), Catalogue No. 57-205, p. 5.

¹¹Ibid., p. 11.

¹²Eric J. Hanson, op. cit., p. 8.

¹³Dudley F. Pegrum, Public Regulation of Business (Homewood: Richard D. Irwin, Inc., 1966), p. 154.

¹⁴Ibid., p. 155.

¹⁵Charles F. Phillips, The Economics of Regulation (Homewood: Richard D. Irwin, Inc., 1965), p. 23.

¹⁶Dudley F. Pegrum, op. cit., p. 155.

¹⁷B. W. Snyder, Rate Engineer, Canadian Western Natural Gas Company, Limited, personal interview, May 28, 1970.

¹⁸S. W. Armstrong, Vice-President, Redwater Utilities, Limited, personal interview, June 2, 1970.

¹⁹J. E. Flavin, Pryde-Flavin Consultants, Limited, personal interview, May 22, 1970.

CHAPTER IV

REGULATORY CONCEPTS AND PRACTICES

Purpose

The purpose of this chapter is to outline some of the major regulatory concepts and to examine critically, current Alberta regulatory practices as they apply to the natural gas distributing industry. The major concepts to be presented are the rate base, the rate of return, operating expenses and the rate structure.

The plan will be to provide a quick review of the statutory duties of the Alberta Public Utilities Board, present the principles of regulation and then examine the actual practices of the Board in Alberta as revealed in the various decisions handed down by that Board.

Regulatory History in Alberta

The concept of regulation through the Public Utilities Board or Commission was legislated under the Public Utilities Act on April 17, 1915. The Act, being Chapter 6, Statutes of Alberta, 1915 was officially called 'An Act respecting Public Utilities, to Create a Public Utility Commission, and to prescribe its Powers and Duties.'¹ The Act, which established a three man Public Utilities Board, outlined the duties, responsibilities, jurisdiction and powers of this Board and it outlined the procedures for the enforcement of the Act.

The first major change of the initial Act came rather quickly, the year following the Act's enactment. Municipal governments operating

public utilities subject to the Public Utilities Act were free to make any agreements with private firms and thus scrutinization and regulation was practically impossible. In 1916, therefore, the Alberta Legislature passed an Act to alter the Statutes of Alberta and made it mandatory for any municipal government to submit such agreements to the Board for approval.

In 1923 the original Act was repealed and re-enacted by Chapter 53, Statutes of Alberta, 1923, as 'An Act to Prescribe The Duties of The Board of Public Utility Commissioners'.² The Act, as re-written, was much more taxonomic in its approach as it provided interpretations and definitions of many terms.

The re-enactment designated a 'Court of Appeal' which was the Appellate Division of the Supreme Court of Alberta. Further legal implications were contained in Section 4 as reference to the court of record was deleted, but judicial noting of the seal was retained.³

In 1927 the Statutes contained an addition to the Public Utilities Act which made specific reference to the natural gas industry. This addition became section 54a of the Public Utilities Act, being Chapter 53, Statutes of Alberta, 1923. It read as follows:

The Board shall have jurisdiction over every contract or agreement entered into on or after the first day of May, 1923, between any proprietor of the public utility and any other corporation or person for supplying to the same proprietor, natural gas, or for the transportation, scrubbing, cleansing or otherwise treating natural gas; and thereupon the corporation or person party to any such contract shall for the purposes of this section be deemed to be the proprietor of a public utility so far as relates to the price payable under such contract, and shall so far as last aforesaid be subject to all the provisions of this Act, and upon the application of any person interested

the Board may by order fix the maximum price which may be charged or paid under such contract, and the price payable under such contract shall be the price fixed by the Board and no other.⁴

The intent of this section is quite obvious. Many of the costs incurred by a gas utility were competitively determined and thus the Board need not regulate these costs. The well head price of natural gas, however, presented an entirely different situation. Gas distributors were often 'tied' to particular suppliers and consequently had little control over the cost of natural gas. Control over distribution prices of natural gas was rather meaningless unless the Board had jurisdiction over such a major variable cost as the well head price of gas. Gas distributors in many cases did not own their sources of supply and the legislature was thus forced to implement a method of controlling prices at the source.

The public utility sector continued to grow rather rapidly during the several decades following World War I and in 1941 it became apparent that the 1923 definition of a 'Public Utility' was inadequate and a more taxonomic definition was written into the Act. The definition was broadened to include industries not considered in previous years and more specific references were made to others; this reflecting the increased sophistication and importance of new expansion and technology.

In 1944, the Government of Alberta enacted 'An Act to Establish the Natural Gas Utilities Board and to Prescribe its Duties'.⁵ It would appear that this action was considered necessary due to the increasing complexity and importance of the natural gas industry in Alberta. This Act, known as The Natural Gas Utilities Act, provided

for a Natural Gas Utilities Board of two members.⁶ The principal objective of the Act was to secure the conservation of this valuable natural resource which prior thereto had been substantially wasted. The Board appointed to administer this Act was given wide powers relating to conservation and among other things was given power to fix the price to be paid for gas at the well-head to well owners in the field.

During the second session of the Alberta Legislature in 1949 the Natural Gas Utilities Act was repealed.⁷ Jurisdiction reverted back to the Public Utilities Board and many of the interpretations contained in the Natural Gas Utilities Act were written into the Public Utilities Act. Major new inclusions were regulation over field pricing of gas and pipeline charges.

No major changes of great interest occurred thereafter until 1960 when the Public Utilities Board Act was repealed by Chapter 85, Statutes of Alberta and re-enacted as:

- (i) The Public Utilities Board Act, being Chapter 85, Statutes of Alberta 1960; and
- (ii) The Gas Utilities Act, being Chapter 37, Statutes of Alberta 1960.⁸

The enactment of a separate Gas Utilities Act again appears to be the direct result of a recognition of the importance and complexity of this industry. Unlike the previous Natural Gas Utilities Act, the major power over regulation remains with the Public Utilities Board. There is constituted, however, a board called the Gas Utilities Board composed of the chairman of the Public Utilities Board, the chairman

of the Oil and Gas Conservation Board and one other member appointed by the Lieutenant Governor in Council who shall be the chairman of this board. Its major duties are outlined in Subsection (1), Section 49b of the Gas Utilities Act.⁹

Where the Public Utilities Board or the Oil and Gas Conservation Board is of the opinion that any application or matter before it (a) may affect directly or indirectly the present or future supply of gas for domestic, commercial or industrial purposes within the Province, or the price or conditions under which such gas is supplied, or (b) having regard to the availability of any other source or supply of gas, to the requirements of users of gas in any part of the Province and to any other circumstances, may affect a public interest, and considers that the application or matter may involve or affect a matter that is wholly or partly within the jurisdiction of the other board, it may of its own notion or on request of any person who may be affected, refer the application or matter to the Gas Utilities Board and notwithstanding any other provisions of this Act or the Oil and Gas Conservation Act, the Gas Utilities Board may grant or refuse the application or make such disposition of the application or matter as it deems proper.

Thus the Gas Utilities Board enters into the scene when jurisdiction is uncertain yet decisions need to be rendered.

Only minor regulatory changes have occurred since 1960, none of which have had a major impact on the Natural Gas Distributing Industry in Alberta.

Duties and Responsibilities of the Alberta Public Utilities Board

Vested in the Public Utilities Board Act, Chapter 85, Statutes of Alberta, 1960, are the powers necessary to enable the Board to execute its functions. This Act is a legislative mandate which has evolved from analogous acts in 1915 and 1923.

Constitution of the Board. Section three of the Public

Utilities Act provides for a Board of three members, one of whom is the chairman, to be appointed by the Lieutenant Governor in Council. These members shall hold office 'during good behavior' for ten years and are eligible for reappointment. Alberta's history has been one of relatively numerous reappointments. Of the thirteen people who were members prior to 1967, five served for a period in excess of the ten year initial appointment. The average length of appointment for all those who terminated duties prior to 1967 was 8.4 years.

(See Appendix B.)

Section ten of the Act states that the Board is a body corporate. This implies the usual--an association of individuals, created by law and existing as an entity with powers and liabilities independent of those of its members.

Sections eleven, twelve and thirteen make provisions for the employment of a secretary and appointment of engineers, accountants, legal counsel, technical and professional persons and other clerks, officers and employees as deemed necessary by the Board. Furthermore the Board may appoint special experts whenever they require specialized information or counsel.

To limit the possibility of vested interests interfering with the smooth operations of the Board, members are required to devote their whole time to performance of their duties under this Act. They shall not acquire any direct or indirect interest in any company that is classified as a public utility or does business with a public utility.

Powers of the Board. Section twenty-eight of the act gives the Board all the necessary jurisdiction and power to deal with public utilities and the owners thereof as provided in the Act.¹⁰

Further powers¹¹ of the Board include the right:

- to order the execution of certain tasks and forbid others (Section 29)
- to hear and determine all questions of law or of fact (Section 30)
- to use all of the powers, rights, privileges and immunities that are vested in the Supreme Court of Alberta (Section 31)
- accept and act upon evidence (Section 32)
- of access to all documents and property of the utility (Section 37)
- to rehear an application before deciding it and may review, rescind or vary any order or decision made by it (Section 56)
- to decide who shall pay for costs incurred in proceedings and may further order by whom and to whom any costs are to be paid (Section 60)
- to present its case before the Appellate Division of the Supreme Court of Alberta if an appeal is launched (Section 65)
- on receipt of complaint of tolls or service to make orders demanding the improvement of service and disallow or change tolls that, in its opinion, are excessive, unjust or unduly discriminatory (Section 71)
- permit the use of the roadways and prescribe the terms and conditions thereof (Section 73)
- order the extension of services and specify conditions including allocation of costs, under which the extension is to be done (Section 75)
- to investigate any matter on its own initiative or upon written complaint (Section 79)

- to require the owner of a public utility to file schedules of rates with the Board; furnish safe, adequate and proper service; keep his books in such manner as the Board may prescribe; furnish annually and at such other periodic intervals as the Board may require, a detailed report of finances and operations; and maintain proper and adequate depreciation accounts (Section 80)
- to, either upon its own initiative or upon complaint, fix just and reasonable rates by determining a rate base on an original cost basis, determining an allowance for working capital and allowing a fair return to be earned on the rate base; fix proper and adequate depreciation rates; fix just and reasonable standards of measurement and service; and require the extending of facilities where economically feasible (Section 81)
- to review the affairs, earnings and accounts of each owner of a public utility every three years. (Section 82)

Particular restrictions, duties and obligations of a public utility. Public utilities are prohibited from charging an unjust or discriminatory rate, using an unreasonable classification for rates, providing unsafe services or denying service stipulated by the Board, issuing capital without approval and changing rates without the approval of the Board.¹²

REGULATORY CONCEPTS AND PROCEDURES IN ALBERTA

The Rate Base

Regulatory bodies are generally called upon to review and approve rate structures which have been determined in accord with some predetermined rate of return. In order to apply the rate of return principle, however, the regulatory body must have an indication of the present fair value of the property upon which this return

is based. This involves the determination of the rate base; a process that has been subject to much controversy. This controversy has raged for many years and a consensus appears as far away as ever. The controversy revolves around the question whether the rate base should be based upon the present value of the utility's property or on the amount originally invested in the property.

The rate base generally includes the net value of the physical property, an allowance for working capital and, it may also include amounts for overhead costs of organizing the business, intangibles and going-concern value.¹³ The value of the physical property--plant and equipment--is by far the largest and most important component entering into the computation of the rate base. It is this area that has been plagued with disagreement as the value arrived at depends directly upon the method of valuation used. Then given that the absolute return allowed varies directly with the value of the property it becomes obvious why a major controversy continues to exist.

Currently there are two major streams of thought debating the valuation problem. One group advocates the original cost theory while the second promotes the reproduction cost theory. Within each of these are several varying concepts but they do not differ dramatically from each other and will consequently be treated within the framework of the two major schools of thought.

i) Original Cost

The original cost concept is simple, easily understood, and operationally effective. Original cost refers to the initial cost

incurred by the public utility in purchasing its plant and property, less accumulated depreciation.

Because the original cost concept is simple it results in inexpensive valuations¹⁴ and its greatest virtue lies in the fact that it is efficiently administered. Regulatory bodies simply base their valuation on past accounting figures which are readily available. The number of controversial issues is reduced and it forces the companies and regulatory bodies to consider the relation of rate regulation to investment needs.¹⁵ A further advantage of this concept is that it results in stable valuations; a stability which tends to eliminate sudden rate changes.

Very few problems or objections arise when the rate base is calculated on newly constructed plants or on newly acquired equipment. If, however, a long time span separates the actual hearing and the date of construction or acquisition then many legitimate objections can be voiced against the original-cost method. Bonbright lists several reasons why this method of calculation may be unpalatable.

. . . because the plant has been transferred to another company at a higher or lower acquisition cost;¹⁶ because the assets have ceased to be used and useful in the public service; because these assets, even though still useful, have undergone depreciation in efficiency or in life expectancy; because a part of their costs has already been recouped by the company through amortization or depreciation charges allowed as operating deductions; because current replacement costs would be higher or lower than historical costs; because increases or decreases have taken place in the general price level; . . . in short, because the original costs have lost their original economic significance.¹⁷

Of these objections the one most often cited is that it disregards changes in the value of money and therefore this system cannot allocate resources properly. This coupled with the overpowering belief that inflation will continue and maintain reproduction costs at a level above original cost makes this a fairly powerful argument. This objection, however, is generally disregarded since the advantages of the system outweigh this obvious disadvantage.

ii) Reproduction Cost

The attack against the original cost concepts draws most of its strength from an article written by Harry Brown in 1925.¹⁸ In this paper he bitterly attacks the original cost method and advocates the reproduction cost method.

The reproduction cost is commonly defined as the replacement cost of the existing plant, measured usually, with the average prices of several recent years.¹⁹ While the weakness of the original cost method lies in its inability to properly allocate resources the reproduction cost method draws special merit in this area. Rates of regulated industries based upon reproduction costs will remain similar to unregulated industries during periods of price changes. This would help avoid tremendous increases or decreases in demand that would result if the valuation were based on original costs.²⁰

Bonbright cites several weaknesses in the reproduction cost method and he dismisses it as a useful regulatory method. He feels that this method will not bring about an optimum allocation of resources. It may bring about a more efficient allocation than the

original cost method but it will not be optimum since it similarly considers total costs rather than incremental costs. Furthermore he shows that the tax factor is not accounted for in the resource argument and that the expenses faced by a utility producer do not actually reflect the social costs involved. Finally he proves that the two valuation methods would yield rather similar results and since the reproduction cost method is vague, subject to various interpretations and administratively inefficient, he feels that it is inferior to the original cost method.

In Alberta, the manner in which the Board carries out its function in determining a rate base is clearly established in subsection (2) and (3) of Section 81 of the Public Utilities Board Act.²¹

81. (2) In fixing just and reasonable rates, tolls or charges or schedules thereof, to be imposed, observed and followed thereafter by an owner of a public utility, the Board shall determine a rate base for the property of the owner that is used or required to be used in his service to the public within Alberta and fix a fair return thereon.

(3) In determining a rate base under subsection (2), the Board shall give due consideration to the cost of property when first devoted to public use, to prudent acquisition cost to the owner, less depreciation, amortization or depletion in respect to each, and to necessary working capital.

Thus the rate base is found by calculating the original cost of plant used and useful, less accumulated depreciation thereon plus a reasonable allowance for working capital.

i) Plant

The phrase 'when first devoted to public use' suggests that the original cost method of determining the rate base is the acceptable

one. This is clearly stated in Decision Number 23965, 1959, of the Board when it considered a request by Northwestern Utilities for a revision of its rate schedule. In this decision it was recorded that, "In the past this Board has adopted an original cost rate base and will do so in this case".²²

This decision arose when Northwestern Utilities, Limited, in its Notice of Motion to the Board stated that:

In fixing a rate base and the rate of return to be allowed thereon the Board should have in mind the long, continued and prospective continuation of inflation in the economy of Alberta and Canada and should give consideration to the present-day value of the Company's property.²³

Thus Northwestern Utilities, Limited was advocating some type of reproduction cost method of determining the rate base. The decision of the Board to refuse the request for a change in rate base determination had many precedents. In a decision handed down in 1921 the Board said:

The Board believes that in place of present value or reproduction cost new, with or without depreciation . . . it is far more reasonable in arriving at a rate base to ascertain the true investment in the utility.²⁴

And further in a 1926 decision, the Board reaffirmed this position by stating:

The Board is of the opinion that the historic cost which has been adopted in connection with the proposed method of amortization should be adopted as the rate-making basis for this property.²⁵

The Board has continually advocated that the convenience of and the lack of expense involved in using the original cost method outweighs the economic and ethical arguments presented in favor of reproduction

cost. The Board contends that it ensures a definite, stable and easily ascertainable rate base which is not affected by changes in price levels, does not afford fortuitous gains to the utility in times of price level increases nor subject it to losses during price level decreases.

Companies have, however, continued to move for changes and it would seem that out of frustration the Board included a seemingly tongue-in-cheek statement in one of its 1958 decisions. This statement was as follows:

The history of public utility regulation reveals that when prices are high the companies advocate a rate base fixed on reproduction costs or at least some weight be given to it and those representing the consumers advocate an original cost rate base. When prices are low the reverse is of course the case.²⁶

The Board in adhering to the original cost position has continually argued that the duty of the Board is to set just and reasonable rates which is, of course, a function of the revenue that the utility company requires. Thus the type of rate base used is of no consequence. If some type of reproduction cost rate base were used then the rate of return required to yield the necessary revenue would be lower than if an original rate base were used. They further contend that the financial integrity of the firm is not undermined by neglecting to take into consideration the decreasing real value of our dollar.

This is equivalent to saying that the rate base and rate of return are jointly decided to give a profit level acceptable at current prices and thus the rate of return has become the crucial variable.

The evidence of the market appears to back the Board in its

contention that it is unnecessary to restate, in terms of recent dollars, the dollar capital account in order to attract capital into the utility industries. Utility companies have experienced considerable growth since World War II and this growth has generally not been financed by retained earnings. Utility companies have had little difficulty financing expansion from the sale of bonds and stocks. Investors, both large and small, in utilities are not acting irrationally rather they look at the total utility picture and they find it fairly attractive. Utility earnings remain fairly stable throughout periods of recession and depression, regulation helps to partially guarantee a fair return, and prices of utility stocks do not suffer from violent fluctuations. The attractiveness of these considerations would appear to outweigh the threat of inflation and it would appear that investors are more influenced by these facts than by the cries of discontentment expressed by various regulated firms.

ii) Depreciation

Concurrent with the job of calculating the value of the plant, used and useful, the Board must determine the depreciation (amortization) which is to be deducted from the value of the plant. In accounting terms, this deduction from the company's property valuation is known as accrued or accumulated depreciation.²⁷

Depreciation, while suffering from many different meanings, will be interpreted as follows:

Depreciation is the expiration or consumption, in whole or in part, of the service life, capacity or utility of property resulting from the action of one or more forces operating to

bring about the retirement of such property from service; the forces so operating include wear and tear, decay, action of the elements, inadequacy, obsolescence and public requirements.²⁸

Thus a unit of property can be expected to render fewer available units of service over time and this is known as depreciation.

The absolute size of annual depreciation depends ultimately upon three factors: (a) net cost of the property--the difference between the cost of the property concerned and its salvage value, (b) the life expectancy of the property, and (c) the method of distributing the costs over the life of the property.

When considering the net cost of property we again encounter the controversy concerning original cost and reproduction cost. In the former situation the annual depreciation charges will be predictable while in the latter the charges will fluctuate as prices change.

The life expectancy of the property can be taken as the length of time from the date of first installation until its ultimate retirement. It is generally determined by engineering estimates and depends upon management policies, the degree of maintenance, obsolescence or advancement in the state of the arts, accidents, action of the elements, wear and tear, economic factors, replacement policies, inadequacy, and the demand of public authorities. Generally a separate charge is not computed for each item but averages are taken for various classes of property.

The method of allocating these charges over time depends upon the regulatory body in question. The two most common methods are the straight-line method and the interest or sinking fund method.

Under the straight-line method, equal amounts are assigned to the depreciation figure each year. If, for example, the life expectancy of a class of items is fifty years, then they will be amortized at the rate of two per cent per annum. This method is very simple and at the end of the life expectancy of the property, the annual contributions will sum up to the original cost of the retired property.

With the interest or sinking fund method, a reserve is set up on the company's records and equal sums are assigned to it each year. Furthermore it is assumed that the fund is invested and earns interest. Obviously the fund will grow and as it does the interest payments will rise resulting in larger sums being credited as depreciation. These contributions are calculated on the basis that the series of payments plus the compounded interest on them will equal the cost of the property retired.²⁹ This method is much more complicated than the straight-line method cited above and is therefore usually avoided by regulatory bodies.

The Board places great emphasis on simplicity in the area of depreciation as shown by the following statement appearing in Decision Number 23616.

It is apparent from the submissions made both by the company and the City that they are unanimous in their desire to have a method or methods which embody simplicity of application. This is a characteristic which appeals to the Board, provided it is compatible³⁰ with the interests of both the consumers and the investors.

Given this desire for simplicity it is only natural that the Board would opt out for the straight-line method of depreciation.^{31,32,33}

The property of a mature natural gas distributing firm is, of course, highly complex and it does not lend itself to simple amortization. For amortization purposes, therefore, the property is divided into a number of classifications with the following breakdown being an example.³⁴

(1) Natural Gas Production Plant

Account	306	Leaseholds
	307	Rights-of-way
	308	Natural Gas Rights
	309	Well Structures
	310	Field Regulating and Measuring Station Structures
	311	Other Production System Structures
	312	Gas Wells
	313	Field Lines
	314	Field Regulating and Measuring Station Equipment
	315	Other Production System Equipment

(2) Underground Storage

- (a) Underground Storage Wells and Equipment
- (b) Gas in Underground Storage

(3) Transmission Systems

Account	318	Rights-of-way
	319	Compressor Station Structures
	320	Regulating and Measuring Station Structures
	321	Other Structures
	322	Compressor Station Equipment
	323	Regulatory and Measuring Station Equipment
	324	Transmission Line Equipment
	325	Other Transmission Equipment

(4) Distribution System

Account	328	Rights-of-way
	329	District Regulating and Measuring Station Structures
	330	Other Structures
	332	Measuring and Regulating Equipment
	333	Distribution Line Equipment
	334	Services
	335	Meters
	336	Meter Installation
	338	Other Distribution System Equipment

(5) General Plant

Account	346	General Office Structures
	347	General Structures
	348	General Office Equipment
	350	General Shop Equipment
	351	General Transportation Equipment
	352	General Laboratory Equipment
	353	General Communication Equipment
	354	Drilling and Cleaning Equipment
	355	General Tool and Implement Expenditures During Construction

The above classification would apply to companies that own some of their own production, storage and transmission facilities. For companies that are purely distributors, section (1), (2) and (3) could be disregarded and only the remaining two sections would be of interest.

While most natural gas distributing firms can be classified as above, it is folly to attempt to apply similar rates of amortization to different companies even though they are engaged in the same business.³⁵ Each company must be treated uniquely and the Board is thus faced with the need to approve amortization rates independently of former decisions. Several factors can be isolated as being the principle contributing reasons why similar companies require separate analysis. First, weather, soil and other physical conditions experienced by one company may greatly affect the life expectancy of, for example, transmission and distribution lines. Second, the stability of the plant, often determined by the age of the company, may be of sufficient importance to warrant lower amortization rates. Third, the nature of the equipment is often sufficiently different to render useless the amortization rates applied to other companies. Thus the

Board must arrive at different formulae for different companies.

In the decision under review Accounts 306, 307, 308 and 312 along with all of section (2) were amortized according to the following formula:³⁶

$$\text{Amortization rate} = .015 \text{ O.C. plus } \frac{\text{Gw.}}{\text{r.}} (\text{D.C.} - .015 \text{ O.C.})$$

where O.C. - the original cost of the assets, used and useful, recorded on the books of the company at December 31 of the preceding year;

D.C. - the original cost of the assets, used and useful, recorded on the books of the company at December 31 of the preceding year less accrued amortization to that date;

Gw. - gas withdrawal from the reservoir during the year;

r. - the reservoir balance remaining at December 31 with respect to each field owned and utilized by the company which shall be the estimated balance of gas reserves capable of being produced at that time plus Gw.

The formula is actually very simple. As the reserves begin to be depleted the amortization rate rises rather quickly with total amortization occurring when the reserves run out. The only component that could cause controversy would be the estimate of the reserves available. This estimate is therefore made and certified by a member of the Association of Professional Engineers of Alberta who is trained and qualified to estimate recoverable gas reserves.

The rate of depreciation which applies to the rest of the plant, with the exception of accounts 348, 350, 351, 352, 353, 354, and 355 which chiefly involve tools and transportation equipment and are amortized according to taxation standards, is established by calculating

the estimated service lives of the various components. These estimates are provided by the company engineers and the service lives of the various components may vary over a large range. The Board then must calculate a component figure which is based upon the average of weighted service lives. In the case under review this average service life was approximately forty-three years which resulted in a straight line annual depreciation rate of 2.3277 per cent. Implicit in this figure is the concept that the salvage value is ignored. The Board therefore decided that the Company could amortize the cost of its plant, used and useful, at an annual rate of 2.5 per cent of the cost of such plant at the preceding December 31 after deducting ten per cent for salvage return.³⁷

Depreciation charges contribute a sizeable amount to annual operating costs and consequently rates can be appreciably affected by these charges. The Board seems to be well aware of this situation as considerable time is spent at rate hearings considering the various contributing factors. Major controversies have been avoided because the Board is aware that no two situations are similar and that when calculating the service life of some facility it depends on a myriad of considerations. Management policies, maintenance, obsolescence, state of the arts, accidents, action of the elements, economic factors, replacement policies and the natural growth of the demand for services all have a direct bearing on the required rate of depreciation. The lack of rigid formulae to be followed appears to have smoothed out regulatory proceedings and been found fairly satisfactory to all involved.

iii) Working Capital

To complete the determination of the rate base it is necessary to consider the concept of working capital. It is the amount of capital, above the investment in fixed assets, that the enterprise requires to function properly. Working capital is an allowance for the amount that the company needs to supply from its own funds to enable it to meet its current obligations as they arise and to operate economically and efficiently.³⁸

The amount required by a company can not be calculated according to a set formula since many factors must be considered. These factors could include the time required to produce and sell the service or product, whether the utility supplies a product or a service, the importance of labor costs, the rate of growth experienced by the utility, the billing procedures of the utility, the ability to collect accounts, the method of payment and the ability of suppliers to supply needed products. The absolute amount required for working capital is thus contingent upon many factors and has to be calculated independently for each utility.

Phillips suggests that the most common method of calculating the required capital is to estimate the operating expenses requiring cash outlays during the period between production and customer payment.³⁹ For illustrative purposes he uses the expenses incurred during forty-five days and from this figure is removed the amount accumulated in deferred federal income taxes and customer deposits.

Decision Number 23965 gives us an insight into Alberta practices

in this area since at this hearing Northwestern Utilities, Limited applied to have its working capital allowance increased from 0.9 million dollars to 1.5 million dollars. At the time the Company showed that its average monthly inventories for the previous fifty-eight months had been slightly over 1.7 million dollars, one-eighth of its cash requirements for the year amounted to approximately .5 million dollars and thus the sum of 1.5 million dollars seemed reasonable in that some consideration was given to customers' deposits and income tax collections.⁴⁰

The City of Edmonton opposed this application and they presented facts which they felt showed that .9 million dollars was adequate. They accepted the Company's figures concerning inventories and cash requirements but they differed when it came to deductions from this total. They felt that the reserve for injuries and damages, as well as one half of the estimated franchise taxes should be regarded as available for working capital.

As argument against the City's stand, the Board quoted Francis X. Welch from his book Preparing for the Utility Rate Case in which he contends that the financial integrity of the firm could be undermined if earmarked funds had to be used as cash working capital. Furthermore the Board contended that since this Company was a rapidly expanding enterprise with promises of future sustained growth it would require additional working capital and so the Board approved the application for an increase in the working capital allowance. The Board felt that it would not be in the best interests of the consumers,

nor the Company to force the Company to take unnecessary operating risks.

An interesting sidelight to this problem in the case mentioned above was that in rejecting the City's plea the Board mentioned that if the .9 million dollar figure was appropriate this time then an error had been made at the previous hearing when the allowance for working capital was set at .9 million dollars. The inference was that the Board could not have made a mistake. This attitude, which appears in print in several decisions, presents certain implications for regulatory control. If this attitude is prevalent among Board members, consciously or unconsciously, then it may be difficult for past mistakes to be rectified and changes in regulatory control very difficult to implement.

It would appear that in the majority of cases, the Board approves the working capital allowance figure that the gas utilities apply for. This figure is rather an insignificant part of the total rate base (approximately 3 per cent in most cases) and thus little time is spent justifying that figure. Concurrent with this is the undeniable fact that this allowance inevitably contains a large element of judgement.

iv) Calculation of the Rate Base

The components necessary for the calculation of the rate base have now been considered. In Alberta the mid-year basis of calculating the rate base has been in effect for many years. The manner in which this is calculated is as follows. Original cost of property, plant

and equipment is calculated at year end and from this is deducted accumulated amortization and other amounts not considered valid. To this figure is added the same balance calculated for the previous year and one-half is taken thereof. The working capital allowance figure is now introduced and the final total represents the rate base for the given year. See Appendix C for an actual example.

While this basic method of calculating the rate base has been in effect for a long time the manner in which depreciation or amortization is applied underwent a fundamental change in 1949.

Previous to 1949 the rate of return was calculated on a gross rate base which represented the actual dollars invested less the dollar cost of actual retirements. Amortization charges, calculated using the straight-line depreciation method, were charged as operating expenses but were not deducted from the rate base. Thus the rate base would decline only slightly if no additional capital expenditures were made. This method was used to offset the possibility that if amortization charges were deducted from the rate base then utility companies may engage in a progressive, gradual and undue expansion of their rate base.⁴¹

There were numerous arguments advanced against the gross rate base and many advocated calculation of a net rate base which is made up of actual dollars invested, less retirements and less the amount of the amortization reserve. Primary arguments in favor of such a deduction can be summarized as follows:

- (a) Amortization reserve is accumulated by charges against operating revenue.
- (b) These funds are collected from customers in form of payment for services.
- (c) They are quasi-trust funds which in effect belong to consumers.
- (d) Failure to deduct amortization reserve results in a duplication of charges and it is therefore inequitable to collect from consumers on account of depreciation and to expend those funds to acquire property on which investors are to be allowed a return.
- (e) The duplication arises from the fact that if the cost of property constructed by the use of depreciation funds is included in the rate base, the consumer is called upon to pay twice, once in providing the annual depreciation and secondly in providing a rate of return on the assets⁴² reflected in the accumulated balance in the reserve.

Faced with these arguments the Board decided that the net rate base was the most appropriate.⁴³ Possible results of this change will be discussed at length in Chapter V.

Rate of Return

The rate of return is that percentage which, when multiplied by the rate base, provides the financial return which a utility company must earn to be able to continue providing its service.⁴⁴ The return which a utility requires depends upon the interest charges on debt obligations, the dividends on preferred stock and a reasonable return on common stock and retained earnings.

The allowable rate of return on the estimated rate base had traditionally been treated with little discussion or controversy. Generally after the onerous task of determining the rate base had been completed, regulatory bodies treated the allowable rate of return

in a one sentence pronouncement. Example: The rate of return allowed shall be seven per cent per annum. Often no explanation or justification was given for the stated figure. Recently, however, the rate of return has been subject to more specialized treatment and several controversies have arisen. This section will deal with the problems as they have arisen in Alberta.

The need to set a rate of return is a statutory duty contained in Section 81, subsection (2) of the Public Utilities Board Act.⁴⁵ The principles that the Board adheres to were set in a Supreme Court decision handed down in a case in 1929. The case, involving a dispute between the Northwestern Utilities, Limited and the City of Edmonton, centered around the decision by the Public Utility Board to decrease the allowable rate of return from ten per cent to nine per cent. The Company contended that the Board had no right to do this. Justice J. H. Lamont in his decision stated that,

The duty of the Board was to fix fair and reasonable rates; rates which, under the circumstances, would be fair to the consumer on the one hand, and which, on the other hand, would secure to the company a fair return for the capital invested. By a fair return is meant that the company will be allowed as large a return on the capital invested in its enterprise (which will be net to the company) as it would receive if it were investing the same amount in other securities possessing an attractiveness, stability and certainty equal to that of the company's enterprise.⁴⁶

While the Board has realized that the financial integrity of the firm must be maintained and that the rate must be sufficient enough to cover capital costs, it does not feel that theoretical principles provide enough information on which to determine a rate of return. The

Board has often^{47,48,49,50} resorted to the term judgement in its decisions and stays away from the use of a pre-determined or mathematical formula.

The hearings in 1958 and 1959, at which Canadian Western Natural Gas and Northwestern Utilities, respectively, had new rates of return established, provide an insight into the manner in which the Board handles the complex problem of the cost of capital. Surprisingly there was disagreement concerning the rate of return allowed on both debt capital and equity capital. Generally the return on debt capital, bonds and preferred stock, is taken as a matter of record yet in this instance controversy was the order of the day.

The companies involved advocated that the prospective rate on debt capital should be used rather than the actual past cost because,

In a competitive economy the prices of goods and services are determined by costs, or by prices which would have to be paid to meet current costs and not historical costs of the means of production, and further because such a policy shifts the burden of the risks and there is incentive for good management and a corresponding penalty for inferior management.⁵¹

The Board, quoting from Eli Clemens' text and from a Federal Power Commission decision, however, felt that it was unfair to consider the prospective cost of debt capital. The decision was, therefore, that the actual past cost of debt and preferred capital, if properly incurred, should be the rate accepted for purposes of determining the rate of return.^{52,53} This has been the traditional method of dealing with this aspect of the rate of return.

The estimation of a fair return on equity capital has long been a perplexing one and consideration of it occupied much of the two

hearings referred to earlier. The problem is that the component of return for equity capital is not susceptible to precise measurement. The ability of the utility to attract capital depends on the investor's view of the prospects for future growth of earnings and dividends per share. The question thus becomes one of determining the rate of return on equity capital which will be adequate to retain the confidence of the investor.

In the final analysis, the Board, after hearing a great number of contrasting views concerning the appropriate manner in which this return should be calculated, took the position that no precise mathematical formula was available and the allowance to equity debt must depend to a large degree on judgement. The Board cited the fact that the companies had little difficulty obtaining capital in the past and that their growth would contribute to a decrease in risk and thus make their stock look very attractive. Thus in determining an adequate return on equity capital, the Board takes account of expert advice and then based on this informed position makes an estimate which it considers fair. The fairness of the rate is based on the principle that it should be comparable to that which could be earned on investments in other companies with similar risks and be large enough to maintain the financial integrity of the company.

The whole exercise described above seems to contain a large element of arbitrariness. Regulatory boards, company experts and consumer representative experts wrestle over the problem of the price of equity capital for days, sometimes months, as they present care-

fully prepared and expensive estimates of practical financial requirements of the company, of fair return under varying assumed levels of inflation, of returns required under various capital structures, etc. All of the players in this exhibition play their role to perfection even though they are all aware that the decision of the Board will be a judgement figure not directly based on any facts or figures. It will be a figure based more on intuition than on fact.

Following the rhetoric of the experts--engineers, accountants, economists and others--the Board, after examination and cross-examination of the estimates which themselves generally produce widely diverging results, determines the fair rate of return. This mysterious figure is determined by the process of judgement. It is not based on any theory, represented by any formula nor does it pretend to represent a compromise. After tons of evidence have been presented this figure is arrived at by judgement and the only direct relation that it would seem to have to the evidence is that the rate of return lies somewhere between the extremes as presented by the company and consumer representatives. Its greatest virtue seems to be that since no one on earth can state categorically how it was found, it is impossible to mount an effective attack against its implementation.

Operating Expenses

The total revenue requirements of a utility firm can be indicated by the formula $R = O + (V - D + W) r$, where R is the revenue required, O is the operating costs, V is the original cost

of property used and useful, D is the accumulated depreciation, W is the allowance for working capital and r is the approved rate of return. Consideration of rates charged by utility firms, these rates being a function of the revenue required, must then follow consideration of the one component remaining in the above formula that has not been analysed--operating costs. Included in these operating costs are all types of operating expenses such as materials, supplies, wages, salaries, maintenance, etc. in addition to annual depreciation charges and all types of taxes. Depreciation charges have already been considered and regulatory bodies have little control over taxes thus only operating expenses will be considered at this time.

Operating expenses constitute a large portion of the revenue requirements of a typical natural gas distributing company. In 1968, for example, the operating expenses of Northwestern Utilities, Limited amounted to fifty-eight per cent of natural gas revenues, for Canadian Western Natural Gas Company, Limited they amounted to sixty per cent and for Bonnyville Gas Company, Limited, a tiny firm compared to the previously mentioned giants, these expenses amounted to sixty-six per cent of total gas revenues.⁵⁴ These figures clearly indicate that the rates facing consumers will be largely a function of the operating expenses and thus it is imperative that regulatory bodies supervise them with respect to their reasonableness. Some voice the opinion that all expenses should be closely scrutinized while others feel that the expenses incurred by the firm should be left to the judgement of management. Where one lies, between these two polar coordinates,

depends ultimately upon one's personal philosophy. Quite obviously, therefore, we encounter a myriad of different opinions.

The problem under discussion can be stated quite simply. Operating expenses in non-regulated industries are reportedly kept in line and reasonable by the competitive forces of the market. Regulated industries, however, are generally monopolies or quasi-monopolies with reasonable rates of return practically assured by virtue of the fact that rates can be altered to yield this allowable rate of return. It becomes clear, therefore, that the operating expenses of regulated companies are not directly controlled by competitive forces and, within certain tolerances, any operating expense could theoretically be covered by an increase in rates since it appears that much of the effective utility demand is highly inelastic. They can, however, be controlled by regulatory boards scrutinizing operating expenses and disallowing improper charges already incurred or by prohibiting extravagant or unnecessary charges before they occur.⁵⁵ Some of the more pertinent areas of concern will now be discussed with actual practices of the Alberta Board presented later.

i) Wages and Salaries

Wages of workers are generally not subject to regulatory scrutiny and are left to the normal channels of labor-management collective bargaining agreements. Wages are determined by the labor market conditions of the day and their level depends upon the strength of the unions, availability of specialized labor and financial position of the firm.

The salaries of management, however, present an entirely different situation. Management is in the position where it can pay itself excessive salaries and have them paid by the consumer by charging these salaries as legitimate operating expenses. In non-regulated industries this type of action would reduce returns to stockholders and would be subject to a rough market check. In a regulated industry, however, the stockholders are aware of the reasonable rate of return that is allowed and any exorbitant salaries are of no concern since they will be covered by the consumer in the form of higher rates. This type of situation can most definitely arise when top management members are also major stockholders. Excessive salaries then become a form of excess profit, above and beyond the allowable rate of return. Regulatory bodies should ensure that this type of situation does not arise by carefully studying management salaries.

ii) Costs of Regulation

The question that arises here -- Should costs incurred by a company in rate hearings be paid for by the consumer or the investor? -- is a tremendously complex one. If the hearing has been called to discuss rate changes that can legitimately be defended by changing economic conditions then it may be fair to classify the expenses as operating expenses. If, however, expenses are incurred in litigation procedures or if a company appeals a commission decision then it seems that the investor should pay for the costs.

The answer to the above question depends upon the motives of

the company when applying for a hearing. There are some costs that can legitimately be charged to the consumer. Regulatory bodies may require annual reports, valuation studies and continuing property records, all of which are examples of costs which would appear to be legitimate. The company may, however, spend excessive amounts on legal advice, preparing long and extensive reports designed to overwhelm commissions, and court costs incurred in fighting commission decisions. These would seem to be unacceptable as operating expenses. Thus regulatory commissions should attempt to interpret the motives of a company and they should become aware of the methods used by companies in presenting their cases before regulatory bodies and/or before the courts.

iii) Public Relations and Political Donations

Given our political and economic structure it is only natural that public utility companies set aside certain sums of money to cultivate their political connections and to influence and mold public opinion in their favor. This is done to make people more sympathetic of their position, show their great contribution to the community, make them better known to potential investors, and show that private ownership is vastly superior to public ownership. Many authors^{56,57,58} are of the opinion that costs of this type should be classified as investor costs and should not be included as a cost of service. This further includes such things as costs of lobbying against regulation, attempting to influence public opinion through the news media, presenting free educational material sympathetic to their cause and

organizing public speaking services.

Most regulatory bodies agree that the above mentioned costs should not be included as operating expenses, however, no such consensus appears to exist when it comes to the consideration of donations and charitable contributions. Again the motives of management must be taken into consideration. If commissions feel that management is truly concerned and it has no ulterior motive when making contributions then these donations should be classified as legitimate expenses. On the other hand if it appears that management is simply attempting to gain sympathy and influence regulatory or legislative commissions then these expenses should be charged to the investor. The simplest solution would be to not allow any of these expenses as they, in effect, force the consumer to donate without having a say as to whether he would like to donate or not. No definite conclusion has been reached in this area and any decisions rendered depend completely upon the thoughts and wishes of the commission concerned.

iv) Sales Promotion

Most utility companies spend a great deal of money attempting to expand their sales. The usual approach is to acquaint the customers, especially residential customers, with the savings and benefits that can be derived from a greater use of their service. These costs, generally thought of as increasing service demand, are traditionally viewed by commissions as being legitimate costs and are therefore charged to the consumer.

No one will deny that some of these advertising costs can

benefit the consumer. Advertising designed to help increase demand may lead to greater utilization of existing plant capacity and to higher net earnings. If commissions are alert and effective then these increases in net earnings will be passed on to the consumer by virtue of lower rates.

Many advertising expenses, however, are not designed specifically to increase the effective demand. It would appear that some expenses are simply designed to enhance the public image of the company. The "Our Alberta Heritage" series produced by Calgary Power Limited, for example, is designed purely to raise the prestige of the company and in no way helps increase effective demand. This series provides entertainment and information but it does not help reduce prices and thus it must be viewed as serving the interests of the investor and should not be considered as an operating expense.⁵⁹

Consequently commissions should look at advertising expenses and allow those designed to increase demand or provide service information as operating expenses and disallow those expenses that are designed purely to enhance the image of the firm and benefit only the investors.

v) Service Charges

Holding company organizations and subsidiary arrangements are very common in the regulated industries and this situation presents complex problems when it comes to the control of expenditures. Regulated companies could pay exorbitant service charges to their subsidiaries and thus large hidden profits could occur. As a result,

commissions must exercise a great deal of control over transactions between affiliated corporations. Some commissions require that copies of all such arrangements must be filed with them. Furthermore some commissions require approval of contracts before they become effective. Every commission has a different approach but virtually all of them maintain the right to question payments made to affiliate companies.

In Alberta, the Board has the statutory duty to review, at least once every three years, the affairs, earnings and accounts of each owner of a public utility.⁶⁰ Ideally this should include a detailed review of the operating expenses of the utility firm in question. Indications are, however, that this review concentrates primarily on an accounting check of the rate base, rate of return, depreciation figures, total costs and revenue requirements while an in depth and critical analysis of the operating expenses is lacking. The review is generally conducted by a chartered accountant on staff and its primary purpose is to act as an audit with the expressed purpose being one of determining whether proper accounting procedures are being used. Care is taken to ensure that operating expenses disallowed at rate hearing time are not embodied in a variety of other accounts and that costs provided from capital funds, and thus becoming part of the rate base, are not also included as an operating expense. It would appear that very little effort is made to analyze actual costs to determine whether they are prudent or not. The traditional attitude has been that management, acting in its own self interest, will keep operating expenses to a minimum.

In reviewing the cases held and the decisions rendered by the Board it appears that while at times some expenses are questioned by consumer representatives, in an overwhelming number of situations the expenses as estimated by company representatives are accepted.^{61,62,63} The one item, generally very insignificant in the total cost structure, that has traditionally been refused, however, is that of donations.^{64,65} Utility firms have argued that donations represent legitimate business expenses but the Board has countered that they would place the consumer in the position of becoming involuntary contributors to charity and thus these expenses have traditionally not been allowed. Other expenses such as wages and salaries, public relations, sales promotions and various legal and service charges are seldom questioned. The public relies on the free voluntary action of management to provide natural gas at the lowest possible cost.

The wages and salaries of the work force and directors and officers, respectively, are subject to commission review in that they constitute a portion of the cost of service. The Board, however, seldom questions these costs except in the situation where small utilities are individually owned and operated. The Board decisions on this subject indicate that it has, at times, disallowed the remuneration desired where the portion of such salaries to total revenues was found exorbitant or where it felt that the salaries were greater than the value of the services rendered. Wage and salary issues, however, almost never arise outside this limited category.

Excessive wages and salaries do not appear to be a problem in

the natural gas distributing industry in Alberta. Generally employees in the industry do about as well, or slightly better than labor employed in manufacturing and mining. An area where they do better than average, however, is in fringe benefits. It is difficult to quantify and compare fringe benefits among industries but it is probably safe to state that employees of the major natural gas distributors in Alberta do better than workers in the average manufacturing concern. For example, in its estimates for operating expenses for 1951 and 1952, Canadian Western Natural Gas declared an amount of \$12,030 for Christmas gratuities to the Company's staff.

Casual conversation with a number of employees of Canadian Western Natural Gas indicate the beneficent paternalism practiced by this company. The employees were all extremely satisfied with the company and spoke of it in very fond terms. Labor-management relations are good, there is a very high degree of job security and overall benefits are as good or better than those in an average manufacturing concern.

The Board maintains the position that the utility companies are the best judges of the value of workers and executive officers. This, the author concedes, is generally true yet observers of the utility sector would breathe easier if the Board gave some firm indication that it was at least aware of all wages and salaries paid and if it made an attempt to periodically analyze these costs and compare them to other industries and to utilities in other provinces.

Costs of regulation in Alberta are generally paid by the company

involved in the hearing. This includes its own costs, the costs of the Board and the costs of the respondents. These costs are added to the rate base and written off over a period of four⁶⁶ or five⁶⁷ years. Under certain exceptional cases,⁶⁸ when it is shown that extra expenses have occurred due to lack of preparation by the company, the Board has ordered that these extra costs be met by the shareholders of the company.

The costs incurred by all parties appearing at a hearing can be very high. In a 1969 hearing, for example, it was estimated that the costs would be \$200,000.⁶⁹ These costs were added to the rate base and written off at a rate of \$50,000 per annum. The rate of return allowed for this particular company was eight and one-half per cent thus the customers concerned were faced with paying an extra \$242,500 for their utility services over the four year period.

Most recent major hearings have dealt with rate increases and thus benefitted the utility owner. While it can be conceded that these increases may have been necessary to ensure continued good service, it is difficult to resolve why the consumer should pay the total costs of regulation and then also pay a rate of return on these costs. The Board should consider alternative methods of dealing with these costs, methods designed to encourage the utility companies and the consumer representatives to be more frugal in their presentations. If this is not done then the people who will benefit most from future regulatory hearings will be the lawyers, consultants and expert witnesses called to testify.

Sales promotion and advertising costs have been questioned in the past⁷⁰ but recently, due probably to the fact that the Board feels these expenses are legitimate business practices, little mention has been made of these expenses. Under these circumstances it would be foolish for the major natural gas distributors not to advertise because the entire cost of the ads can usually be passed on to the customers. This is not like an unregulated company in that the management of such a company could spend so much on advertising that its profits would be reduced but it could not turn to a government agency to obtain a price increase that all customers would be required to pay.

The great multitude and complexity of advertising techniques used and customer services supplied by the major distributors, should be viewed with a critical eye. These services, albeit useful in many ways, are designed primarily to enhance the public image of the companies and make them appear as if they are major cogs in our free enterprise system. When customers are convinced that the privately owned utility company makes a unique and important contribution to our society then it must be extremely difficult for regulators to be completely objective in their day to day decisions. For these reasons it is imperative that the Board scrutinize these costs very closely and approve only those projects which appear designed to directly increase the sales of natural gas or provide information necessary for the full and safe utilization of the product.

A look at the 1969 Annual Report of Northwestern Utilities

gives an indication of the promotion schemes utilized by that company.

The company continues its policy of striving to provide its customers with the finest possible natural gas service. This service policy is pursued on many fronts, ranging from appliance adjustments, safety inspections, homemaker assistance and kitchen planning to demonstrations, public information, school information programs and distribution of literature.⁷¹

And further on in the same report:

Home service section gave advice to more than 100,000 people by mail or telephone. Home economists conduct many kinds of demonstrations ranging from food preparation to laundry hints and gourmet cooking. New approaches now launched include a new babysitting course⁷² in an effort to make the company known to the teenagers.

It is very difficult to ascertain the value of these services to the customer. United States Senator Lee Metcalf and Vic Reinemer in their book Overcharge are extremely critical of the many peripheral services provided by utility companies and they accuse the investor-owned utilities of engaging in these activities purely to perpetuate the status quo.⁷³ It is doubtful, however, if you could get many customers to object to these services since they obviously make extensive use of them. These services may indeed be a method for avoiding rate reductions by increasing operating expenses but until the Board actually documents these costs and makes them known to the public, the vast majority of consumers will be more than happy with the 'free' services that are provided.

It may be advantageous to point out at this time that while it is the duty of any regulated public utility to attempt to provide its service at the least reasonable cost it is the responsibility of regulation to ensure that this duty is properly discharged. If this

means that regulatory bodies must 'invade' the territory previously considered the exclusive domain of management, then be it so. The implication here is not that management has necessarily performed badly in carrying out its duty, only that if regulation is to actually be regulation in the true sense of the word then it only seems reasonable that regulatory bodies have the right and, more important, the responsibility to look into the affairs of management.

When considering costs it is obvious that the consumer of utility services should pay as much as is required to cover the costs in free markets of attracting and holding various factors of production that are required. There is, however, no valid reason why they should pay more or, for that matter, less. The total sphere of company organization, financing, accounting and operation must thus be of concern to the regulator because all of these categories contribute directly to the rates charged the ultimate consumers. In Alberta the Public Utility Board appears not to have exercised this duty and has left it exclusively in the hands of the natural gas distributors.

The Rate Structure

The rate base along with the rate of return provide the quantities with which to determine the revenue requirements of a firm.⁷⁴ The next step is to present a price or rate structure whereby the firm can raise this revenue. Many people are under the false impression that regulatory bodies often set the rate structure and force the firm

to accept their decision. Actually most regulatory bodies allow the firms to set their own rates and only a supervisory position is taken by the board. The board must, however, maintain control over the rate structure to ensure that every customer is treated equitably. Their criteria for judgement, admittedly extremely subjective, is that rates must be 'just and reasonable' and that 'undue or unjust' discrimination among customers does not occur. Thus in the setting of a rate structure one must consider the determination of the particular rates and the relationships that exist between the rates.

This section will deal with the manner in which firms set their rates and furthermore the economic implications of these rates will be discussed.

Public utilities often provide a single service and nothing else. We would expect, therefore, that since they were concerned only with selling a single product that the firm would sell this product at one price. This, however, is not the usual case as there are often very large disparities in the rates applied to different consumers.

Natural gas distributors, in establishing rate schedules, attempt to rationalize rate making by allocating total costs, including the return on the rate base, into three classifications, namely customer costs, commodity costs and demand costs.

Customer costs are those costs which can be directly assigned to each customer. The expense of installing service equipment, such as lines and meters, the cost of meter reading, billing, collection, and the like, come within the customer costs' category.⁷⁵ These costs

vary with or are dependent upon the number of customers served and are not related to the volume of gas sold.

Commodity costs vary with the amount of consumption. Main item of cost in this category is the cost of purchased gas.

Demand costs are a function of or are related to the requirement to supply customers to the maximum extent of their requirements on the peak day of the year. These costs are distributed in proportion to their maximum daily demand.

Thus it is obvious that prices may be different for different consumers because the costs of providing the service may be unequal. This may be caused by a variety of reasons. Casual or infrequent users of a service are more expensive to serve than are continuous users since their load factor is very low. Consumers living in areas of dense markets are easier to serve than are those in sparsely populated or undeveloped areas. Finally costs may differ depending on what time of the day the service is required. It is more expensive to serve a customer during peak load periods than during offpeak hours. Thus there may be a great deal of differentiation between the rates faced by various customers yet there are legitimate reasons for these inequalities.

While gas distributors maintain that they allocate joint costs to individual consumers the cost of servicing various customers is seldom calculated, in fact in many cases it would appear that it is impossible to allocate costs. Thus rate differentiation must depend upon something else and generally it depends upon differences in demand

or upon the value of the service. As Phillips stated it:

A customer's demand is based upon his need or desire for the service, his ability to pay for it, and the availability of substitutes. Customers have relatively elastic demands when they have little need for the service, or when they can provide it for themselves or purchase it from a competing seller. Customers have relatively inelastic demands when their need and ability to pay for the service are great and when no⁶ alternative sources of supply or substitutes are available.

Thus if a consumer presents an inelastic demand for natural gas it becomes possible for the firm to discriminate against this customer by charging him higher rates than the firm charges customers with an elastic demand. This is not necessarily undesirable as it may result in everyone obtaining rates that are lower than if discrimination was not practiced. As this statement may sound rather dubious, it is useful to mention briefly the economic theory underlying price discrimination.

Price discrimination occurs when rates are based upon the value of the service, that is, what the buyer can afford to pay, rather than on the cost of the service. For price discrimination to be possible several conditions must hold. First, the discriminating firm must be free from strong competition, whether it be intra- or inter-industry competition. This implies that readily available substitutes are not to be found. Second, the product supplied must be nontransferable or else customers at the lower price would buy the product and resell it at a higher price. Most services provided by public utilities fall into this category of non-transferability. Third, for price discrimination to be profitable consumers must present different

elasticities of demand at each price level. If elasticities were similar then no benefit would be derived from practicing price discrimination.

In the public utility sector price differences may, or may not, reflect price discrimination. Price differentials generally exist between different consumer groups: the most prevalent grouping being residential, commercial and industrial. These differences often represent price discrimination in that residential demand is usually the most inelastic and thus this group faces the highest rates while the opposite can be said of the industrial group. These price differentials may, however, reflect legitimate cost differentials. The greatest demand by residential consumers often occurs during peak load periods consequently they are charged higher rates while commercial, and particularly industrial users, spread out their demand and are thus cheaper to serve. Similarly it is conceded that small users are more expensive to serve, per unit of output, than are large users thus smaller consumers face higher rates. Therefore rate differentials may arise partly due to price discrimination and partly due to legitimate cost differences.

At this point it might be necessary to note that price discrimination may be advantageous. It may lead to lower prices for every customer and a fuller utilization of a plant's capacity. In fact, price discrimination should be encouraged in the public utilities industries if the following conditions are met. Firstly, all customer groups face a lower price than if a single price were

charged. Secondly, the marginal cost of the service should represent the minimum possible rate. Thirdly, output should be maintained at a point where marginal cost is equated to the demand price. This prevents anyone from being denied the service that he desires. If all of these conditions were met then any objections to price discrimination would dissipate.

The duty of any regulatory Board is to ensure that all customers are faced with fair and just prices. Boards can make suggestions concerning rate structures but more often they prefer to watch the rate of return and allow the firm to set its own relative prices. Any Board will, however, accept complaints and if they judge a price to be unduly discriminatory or unjust they have the power to force a firm to alter its rate structure.

The Alberta Public Utilities Board, while having the statutory right to fix just and reasonable rates,⁷⁷ has traditionally taken the position that rate making, that is, the determination of each of the individual rates that comprise the rate structure, is the rightful function of management in the first instance.^{78,79,80,81} Management is required to file rate schedules with the Board and only if it is clearly demonstrated by consumer groups that these rate schedules are unfair, unjust or unduly discriminatory will the Board step in to initiate action.

It would appear that the Board does not closely scrutinize individual rates, for example the rate to residential users in a particular city, and determine their fairness; rather in practice they only question these after representations from various customer

groups. The objections of these interested parties are analyzed against evidence produced by the utility concerned and the Board then decides whether the rate schedules are unfair, unjust or unduly discriminatory. If the Board agrees that some consumers are being poorly treated they will request that the utility prepare new rate schedules and further negotiations between the consumers and the utility will take place. If the rates appear fair to the Board then the utility can begin gathering revenue as per the new schedules.

The entire question of rates, as perceived by the Board, is that rate setting is a function of management and the Board seems to have great faith in the integrity of this group. Contained in Decision 24138 is the following passage which supports the above statement.

It must be recognized that the persons who are most capable of exercising the necessary judgment in rate making and producing an equitable result are the company officials who must retain existing customers and attract new ones.⁸²

The necessity of attracting new customers does provide a partial argument for suggesting that management will keep its rates as equitable as possible. Potential industrial users may be fairly price conscious but it remains doubtful that potential commercial and residential consumers are completely aware of the pricing policy as pursued by the utility supplying them with gas. If rates become prohibitive⁸³ then potential commercial and residential consumers would seek other sources of energy. Natural gas, however, because of its flexibility and low cost has virtually one hundred per cent

saturation with respect to space heating and water heating in the communities it serves.⁸⁴ This indication of overwhelming superiority of natural gas in these areas can be taken as a possible sign for concern. Natural gas may be much more economical than alternative sources of energy yet some consumers may be unduly discriminated against in comparison to other classes of consumers. The Board only acts on complaint thus leaving open the possibility that certain groups of consumers may be unaware of their relative position, the result being that they are paying higher prices than they rightfully should be paying.

When the Board states that utility companies must treat all customers fairly so as to retain their customers it would appear that they are pursuing a 'head-in-the-sand' policy. It is not a simple matter to convert from the use of one energy to another. This is especially true of residential and commercial consumers where energy is viewed as a virtual sunken cost. In 1966 seventy per cent of all natural gas revenues in Alberta were gathered from residential and commercial consumers,⁸⁵ making it highly possible that a large portion of the natural gas rates could be unduly discriminatory without having any adverse impact on overall sales.

The concept of 'unduly discriminatory' is, by its very nature, categorically impossible to define. The Board views each case as an isolated entity and makes its decision based upon such things as the historical background of rates, the current load conditions, the preservation of existing loads and the necessity of attracting new loads.⁸⁶ The Board accepts the fact that some price discrimination

is acceptable and beneficial⁸⁷ yet it is unable to provide the degree to which it is so. In an overwhelming number of cases the Board accepts the rate schedules as presented by the utility companies and thus it becomes obvious that either the companies do not discriminate unduly or they are accurate judges of what the consumers and the Board will accept.

Conclusion

The contention of the Public Utilities Board--that the regulatory climate in Alberta has been acceptable to both the public and the regulated companies--would seem to be supported by evidence. Very few major controversies have been experienced since the first Public Utilities Act was enacted in 1915. The suggestion implicitly contained in the Board's contention is that since the regulatory climate has been found acceptable any perceptive person will conclude that regulation has thus been good. This, however, does not necessarily follow. It is not difficult to discern that even though customers are satisfied with the price they are currently paying for a service they may not be getting it as cheaply as is reasonably possible. Thus while regulatory control has certainly been smooth in Alberta it may not have been as effective as possible.

FOOTNOTES

¹Government of the Province of Alberta, Statutes of Alberta, 1915 (Edmonton: King's Printer, 1915), Chapter 6.

²Government of the Province of Alberta, Statutes of Alberta, 1923 (Edmonton: King's Printer, 1923), Chapter 53.

³Ibid., Chapter 53, Section 4.

⁴Government of the Province of Alberta, Statutes of Alberta, 1927 (Edmonton: King's Printer, 1927), Chapter 39, Section 3.

⁵Government of the Province of Alberta, Statutes of Alberta, 1944 (Edmonton: King's Printer, 1944), Chapter 4.

⁶The two members were the Chairman of the Public Utilities Board and the Chairman of the Petroleum and Gas Conservation Board.

⁷Government of the Province of Alberta, Statutes of Alberta, 1949 (Edmonton: King's Printer, 1949), Chapter 4.

⁸Government of the Province of Alberta, Statutes of Alberta, 1960 (Edmonton: Queen's Printer, 1960), Chapter 37 and Chapter 85.

⁹Ibid., Chapter 37, Section 496, Subsection 1.

¹⁰Ibid., Chapter 85, Section 28.

¹¹Ibid., Sections 29 to 82.

¹²Ibid., Sections 87 to 89.

¹³Paul J. Garfield and Wallace F. Lovejoy, Public Utility Economics (Englewood Cliffs: Prentice-Hall Inc., 1964), p. 56.

¹⁴Some economists may object to the word valuation saying that the Board does not attempt to find the value, only the cost of the plant and property. This criticism will be duly noted and then discarded.

¹⁵Charles F. Phillips, The Economics of Regulation (Homewood: Richard D. Irwin, Inc., 1965), p. 239.

¹⁶For example the plant may have been constructed at a cost of two million dollars and then sold to a public utility at three million dollars. Do we consider the two million dollars to be the original cost or is it three million dollars?

¹⁷J. C. Bonbright, Principles of Public Utility Rates (New York: Columbia University Press, 1961), p. 161.

¹⁸H. G. Brown, "Railroad Valuation and Rate Regulation," Journal of Political Economy, Vol. 33 (1925), pp. 505-530.

¹⁹Emery Troxel, Economics of Public Utilities (New York: Rinehart and Company Inc., 1947), p. 262.

²⁰Consider the usual case, a period of inflation, during which demand would increase. This increase in demand would be considered wasteful since it would not truly reflect the economic conditions of the day. Consumers would not be covering current reproduction costs and therefore indulging in wasteful consumption. Furthermore this increased demand would probably result in further investment and an over allocation of resources to the regulated industries.

²¹Government of the Province of Alberta, Statutes of Alberta, 1960, Section 81, Subsections (2), (3) and (4).

²²Decision 23965 File: P.U. 2742-2. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its rate schedules, p. 6.

²³Ibid., p. 1.

²⁴Decision 23616 File: P.U. 2551-2. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, p. 6.

²⁵Ibid., p. 6.

²⁶Ibid., p. 6.

²⁷Phillips, op. cit., p. 244.

²⁸Ibid., p. 191.

²⁹Clair Wilcox, Public Policies Toward Business (Homewood: Richard D. Irwin, Inc., 1966), p. 309.

³⁰Decision 23616, op. cit., p. 13.

³¹Ibid., p. 15.

³²Decision 23965, op. cit., p. 13.

³³Decision 27999 File: P.U. 7349-3. IN THE MATTER OF "The Alberta Government Telephones Act": AND IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Alberta Government Telephones for a revision of its rate schedules.

³⁴Decision 23616, op. cit., pp. 14 and 15.

³⁵Decision 23965, op. cit., p. 8.

³⁶Decision 23616, op. cit., p. 17.

³⁷Ibid., p. 18.

³⁸I. R. Barnes, The Economics of Public Utility Regulation (New York: F. S. Crofts and Company, 1942), p. 495.

³⁹Phillips, op. cit., p. 254.

⁴⁰Decision 23965, op. cit., p. 14.

⁴¹Decision 11915 File: P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, p. 4.

⁴²Ibid., pp. 12 and 13.

⁴³Ibid., p. 17.

⁴⁴Decision 23616, op. cit., p. 27.

⁴⁵Government of the Province of Alberta, The Public Utilities Board Act (Edmonton: Queen's Printer, 1968), p. 22.

⁴⁶"Northwestern Utilities, Limited vs The City of Edmonton," Canadian Law Reports (Ottawa: King's Printer, 1929), pp. 192-193.

⁴⁷Decision 23616, op. cit., p. 43.

⁴⁸Decision 23965, op. cit., p. 28.

⁴⁹Decision 27999, op. cit., p. 21.

⁵⁰Public Utilities Board, Duties and Responsibilities of the Public Utilities Board (Edmonton: The Board, 1967), p. 6.

⁵¹Decision 23616, op. cit., p. 30.

⁵²Ibid., p. 31.

⁵³Decision 23965, op. cit., p. 22.

⁵⁴Percentages were calculated from figures contained in the annual reports published by the firms in question.

⁵⁵Phillips, op. cit., p. 182.

⁵⁶Troxel, op. cit., pp. 241-242.

⁵⁷Phillips, op. cit., pp. 185-187.

⁵⁸Eli W. Clemens, Economics and Public Utilities (New York: Appleton-Century Crofts, Inc., 1959), pp. 130-131.

⁵⁹For a caustic denunciation of these practices see: Lee Metcalf and Vic Reinemer, Overcharge (New York: David McKay Company, Inc., 1967).

⁶⁰Government of the Province of Alberta, The Public Utilities Board Act, Section 80, Subsection (1).

⁶¹Decision 23616, op. cit., pp. 24-26.

⁶²Decision 23965, op. cit., p. 19.

⁶³Decision 27999, op. cit., p. 12.

⁶⁴Decision 23616, op. cit., p. 25.

⁶⁵Decision 23965, op. cit., p. 19.

⁶⁶Decision 29547 File: P.U. 3751(1). IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Canadian Utilities, Limited for a revision of its rates to be charged to its customers for electric energy, p. 34.

⁶⁷Decision dated March 29, 1952, File: P.U. 2742. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its customer rates, p. 17.

⁶⁸Decision 29845 File: P.U. 3751-(1). IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Canadian Utilities, Limited for a revision of its rates to be charged to its customers for electric energy.

⁶⁹Decision 29547, op. cit., p. 71.

⁷⁰Decision dated July 26, 1951, File: P.U. 2742. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a variation of its rates, p. 10.

⁷¹Northwestern Utilities, Limited, 46th Annual Report 1969 (Edmonton: Northwestern Utilities, Limited, 1969), p. 9.

⁷²Ibid., p. 10.

⁷³Metcalf and Reinemer, op. cit.

⁷⁴For example, hypothesize the following situation. The rate base for a given firm is calculated at one million dollars with an allowable rate of return of 7½ per cent. The revenue requirement of the firm is thus \$75,000 plus all operating costs.

⁷⁵Decision 12189 File: P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, p. 1.

⁷⁶Phillips, op. cit., p. 306.

⁷⁷Government of the Province of Alberta, The Public Utilities Board Act, Section 81, Subsection (1).

⁷⁸Decision 23616, op. cit., p. 2.

⁷⁹Decision 23965, op. cit., p. 3.

⁸⁰Decision 24138 File: P.U. 2742-2. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its customer rates, p. 2.

⁸¹Decision 27999, op. cit., p. 6.

⁸²Decision 24138, op. cit., p. 3.

⁸³Gas rates could be considered prohibitive when the cost of natural gas service is so high that it makes economic sense to incur the costs involved in switching to another source of energy.

⁸⁴Canadian Western Natural Gas Company, Limited, 56th Annual Report 1967 (Calgary: Canadian Western Natural Gas Company, Limited, 1967), p. 4.

⁸⁵The Dominion Bureau of Statistics, Gas Utilities (Ottawa: Queen's Printer, 1966), Catalogue No. 57-205, p. 15.

⁸⁶Decision 24138, op. cit., p. 3.

⁸⁷Ibid., p. 13.

CHAPTER V

POSSIBLE EFFECTS OF REGULATION

Purpose

The layman's criteria for utility success and achievement has long been steady increases in capacity with considerable excess capacity to avoid service interruptions, increases in labor productivity brought about by increases in mechanization and the introduction of new diverse services into old and new markets. Recently this line of thinking has been challenged in papers and books by Averch and Johnson, Wellisz and Hawkins.¹ They have all suggested that regulation of the rate of return may result in an excessive use of capital by regulated public utilities.

If the rate of return allowed by regulatory authorities is larger than the cost at which the public utility can secure capital then the utility will have an incentive to expand its investment and increase its absolute level of net profits. This investment may manifest itself in an increased relative use of capital in the production process, an outright expansion of capacity and an extension of services into other markets. In all of these instances the volume of investment may exceed the socially optimal level.² As shown earlier, the volume of utility investment is very large so the social loss from this effect of regulation, if indeed investment is pushed beyond the optimum level, may be very large.

The purpose of this chapter is to review several of the economic models that seek to explain the level of utility investment under regulation and then to analyze the Alberta natural gas distributing industry in an attempt to determine whether the models can, in part, explain the development of the industry.

Averch-Johnson Model

Averch and Johnson, in their paper, theorize the effects of regulation on a monopoly firm which maximizes profit subject to the regulatory fair rate of return. The manner in which they conducted this study was to examine a hypothetical firm's allocation of labor and capital under unregulated conditions and then compare it to a regulated situation. Two factors of production--labor (L) and capital (K)--were employed and it was assumed that the rate of return allowed by the regulatory body was greater than the cost of capital. An isoquant-isocost analysis was then employed to produce their results.

Under unregulated conditions the market cost of capital and labor generate the isocost curve A. The isoquants (I, II, III, IV) show the different combinations of capital and labor which will yield various levels of output. The maximum output at the least-cost position is found at the point where isocost A is tangent to the highest possible isoquant. Thus the firm will move along expansion path 1, any point on which the market costs of the inputs will be minimized for any given output.

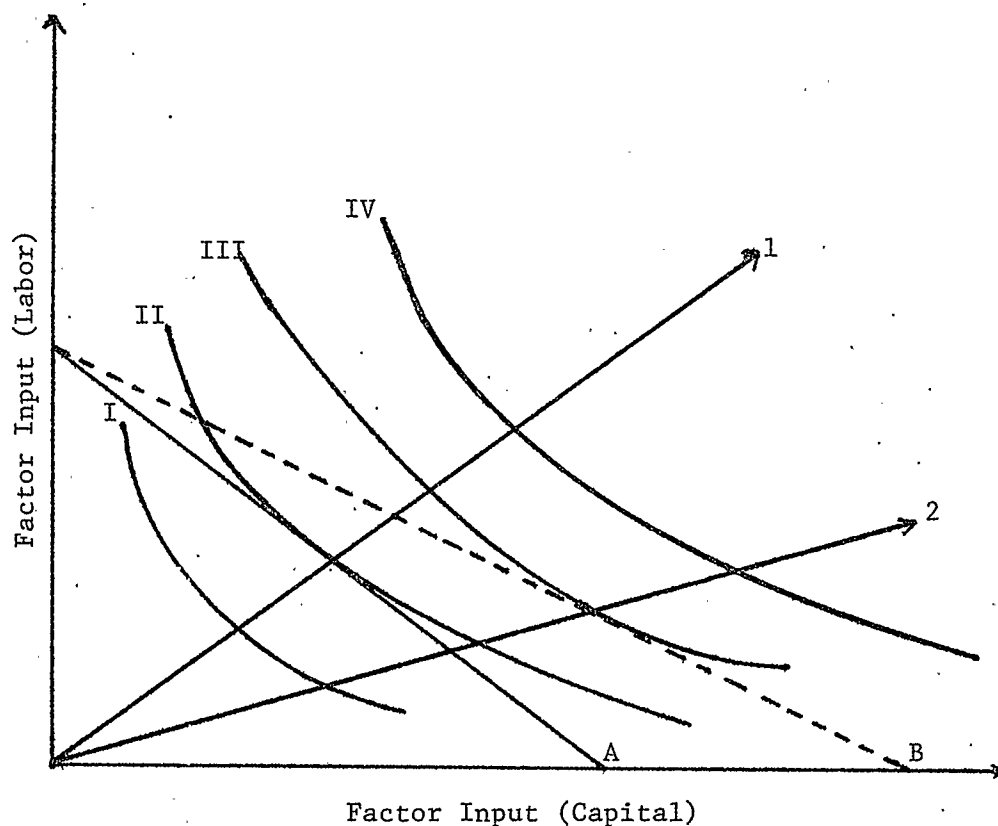


Figure 2

ISOCOST, ISOQUANT ANALYSIS

The introduction of regulation upsets this position as the cost of capital to the firm is no longer equal to the market cost. If we denote the market cost of capital by ' i ' and the regulated rate of return by ' r ' and if $r > i$ then for each addition to plant and equipment of ' K ' the firm is permitted to earn a profit of $(r - i)K$ which in effect reduces the actual cost of capital ' c ' by $(r - i)$ below the

market price thus $c = i - (r - i)$. The result of regulation is to make capital relatively less expensive than labor and the isocost line B is now the relevant one since capital will be substituted for labor until the marginal rate of technical substitution of capital for labor is equal to the ratio of the cost of labor to the cost of capital. The firm will now move along expansion path 2 where the firm is in a position to maximize profits given regulatory constraints on its rate of return. Implied by expansion path 2 is that for each level of output the least cost combination of resources will involve more physical capital for each unit of labor.

The same result can be reached by noting the substitution of productive factors which result when the rate of return, based upon one of these factors, is held to a level less than a firm could gain if left free to maximize profits. The rate of return is based upon the capital investment made by the firm and thus if profits begin to exceed the regulatory level the firm will quite naturally substitute capital for labor or make capital intensive investments. Averch-Johnson go further and show that regulation costs of the inputs will not be minimized for any given output. The implication of this is that a firm being regulated will increase its ratio of capital inputs to other inputs and thus increase social costs at the equilibrium output.

A second conclusion that Averch and Johnson come to is that regulatory control will provide incentives for expanding into new markets even if operations in them are carried out at a loss.³ Their contention is that if the regulatory board applies the

allowed rate of return to the total rate base rather than to the rate base in each separable market then the firm may have an incentive to expand to these other markets even if costs are not completely met. A hypothetical example may help clarify this point.

Assume that a firm is experiencing revenues and costs such that it is exactly receiving its allowed return of eight per cent. It then obtains a franchise in some town and makes capital expenditures of one million dollars when installing the distribution system. Assume this capital is obtainable at five and one-half per cent. Further assume that total operating costs will amount to \$210,000 per annum while revenues will only amount to \$200,000 per annum with no expected change in either of these in the long run. Thus the firm will experience long run losses and an explanation is required for why the firm would seek this franchise.

Since the profits allowed for the firm's operation refer to the entire system, the firm can now increase its profits by \$80,000 (8 per cent of one million dollars) and still remain within the applicable constraint. It can do this by attempting to increase revenues in its total operation or it can apply for a general rate increase. Thus the cost of servicing the million dollar debt will be \$55,000 per annum and an additional operating loss of \$10,000 per annum will reduce profits by \$65,000 but since the firm has the right to increase its allowable return by \$80,000 due to its expanded rate base, this firm can increase the return to equity stock by \$15,000 by establishing a franchise in a market where it faces continuous losses.

It now becomes obvious why this firm may succeed in discouraging the entry of other firms even if these other firms are lower cost producers. Assume a small independent firm, without an existing rate base, could install this distribution system for the same one million dollars yet operate it for only \$150,000 per annum or \$60,000 per annum less than the previous hypothetical firm. It is very doubtful if this firm would be able to garner the franchise since to obtain its return of eight per cent it would require revenues of \$230,000 and rational consumers will obviously opt out for the other firm since it will charge the lowest rates. Hence this hypothetical example reveals why a relatively low-cost producer may never enter the industry.

It may be useful, furthermore, to point out that the cost concepts relevant for the evaluation of rates is the additional costs that must be defrayed by the firm when another franchise is added. If these additional costs are not fully met by the particular rates set for the area then the consumer will be paying less for the productive resources used to supply the gas than would the consumer of some other commodity had these resources been used to produce that commodity. The output produced by additional resources drawn into the production of natural gas will have a lower value than if the resources had been used in an alternative occupation. This argument is basically the Pareto-Lerner welfare economics concerning an optimum allocation of resources and in this situation there is a misallocation of resources and a reallocation would be possible that would make everyone better off.

Evidence Supporting Implications of Averch-Johnson Model

The fact that the companies have become more capital intensive is obvious. Their expansion in plant and equipment has been many fold while the size of their labor force has remained virtually constant over the past two decades. This phenomenon does not appear to be unique to regulated firms and furthermore, since the relative importance of the labor force is so small in the natural gas distributing industry we can safely assume that even if this increase in the ratio of capital inputs to labor inputs would not have occurred in a non-regulated firm, the social cost of this misallocation is very small. We will thus relegate Averch's and Johnson's first contention to the realm of interesting but, in this situation, not highly useful exercises.

Their second contention, that regulated firms have an incentive to expand, even into loss areas, is of much greater interest.

In 1926 the Public Utilities Board reaffirmed that natural gas utilities were entitled to receive a rate of return on a gross rate base or on the total expenditure in plant and equipment without any annual amortization deduction.⁴ In this decision the Board pointed out, "the importance of avoiding a progressive, gradual and undue expansion of the rate base."⁵ Thus the Board seemed to realize that if annual amortization was deducted and a net rate base was used the company would be encouraged or forced to expand. During the next several decades the companies did expand but as pointed out in Chapter III this expansion was limited almost exclusively to the

original facilities.

In 1949 the Board adopted the original cost less the amortization reserve method of calculating the rate base. Coinciding with this event in 1949, Canadian Western Natural Gas declared an interest in seeking franchises in communities not served by natural gas. The growth in the number of new franchises served by the two major International Utilities' companies in the period following 1949 is documented in Chapter III and shows an almost unbelievable expansion. While exact data are not available concerning the total number of new franchises installed in this period the author can, without fear of being contradicted, state that an overwhelming majority of these were installed by the International Utilities group.

Thus in viewing the natural gas distributing industry we find that the regulatory setting--allowed rate of return on a net rate base--and the market structure--a large dominant enterprise--are consistent with the Averch-Johnson model. Furthermore the type of growth experienced by International Utilities is similarly consistent with the hypothesized behavior of the firm under regulatory constraint, that is, the firm has an incentive to expand into other regulated markets.

While the recent growth of International Utilities is in accord with the model it is necessary to consider other possible reasons for this growth.

As indicated in Chapter III the growth in existing facilities and the addition of distribution systems along existing company owned

transmission facilities can probably be attributed to the company's attempt to take advantage of available economies of scale. When considering expansion into new franchises not part of the existing network, however, then the economies of scale argument loses much of its strength.

Consideration must be given to the possibility that population increases in small communities made it economically worthwhile to establish franchises in these centres. To accomplish this the author obtained 1941 and 1966 population figures for the minor communities served by Canadian Western Natural Gas in 1969. Population figures were available for fifty-eight of the eighty-nine minor communities served in 1969. The other thirty-one communities were so small that the Alberta census did not provide population figures for them.

The average increase in population per community during the period 1941 to 1966 was only 467. Of the fifty-eight communities surveyed, nine showed absolute decreases in population. Furthermore it is probably safe to assume that the thirty-one communities not included in the 1966 census were certainly not high growth centres thus almost completely negating the possibility that the large growth in the number of franchises served was due to natural population increases.

Finally heed must be given to the possibility that this growth was a direct result of the discovery of new and easily accessible sources of natural gas and/or the construction of major export transmission pipelines from which natural gas can be purchased. The

effects of these developments are undeniable since many communities now served have available sources of gas in close proximity making it possible for them to be served. The question of why International Utilities was able to garner most of these new franchises, however, is not answered by this fact. Attention will now be given to that aspect of the problem.

The model as presented by Averch and Johnson suggests that firms may have an incentive to expand into new areas even if they operate at a loss in these areas. Does this explain why International Utilities has been able to expand so rapidly? Proof of this possibility would be a tremendously burdensome and conceivably an impossible task. It is very difficult, some claim impossible, to accurately determine the cost of providing a particular service in a complex firm like a gas distributing company. Some variable costs, like the cost of gas at the well-head, are easily discernible but other costs, jointly or commonly incurred with other parts of the system, are difficult to allocate. The problem then is how should common or joint costs be apportioned among the various systems within the complex network of a modern gas distributing company.

It is not the intention of the author to enter the joint-cost controversy and thus information will be provided which strengthens, but does not prove, the argument that International Utilities may be serving some areas at a loss.

In 1964 the City of Edmonton commissioned a study to consider the feasibility of the City operating its own natural gas utility

which until that point had been operated by an International Utilities' company. In this study it was shown that in 1963 the average price paid by Edmonton consumers was 33.3 cents per MCF; for the whole system the average was 32.3 cents and for the portion of the system outside Edmonton it was 30.6 cents.⁶ Thus natural gas rates were approximately three per cent higher in Edmonton than the average for the entire system and eight and one-half per cent higher than the system excluding Edmonton. Some of this difference may be attributable to the fact that the City of Edmonton had a higher proportion of commercial and domestic buyers than did the rest of the system. Even considering this aspect the study purported that if the City distributed its own gas it could do so at 1.6 cents or 4.7 per cent less than the estimated company price of 34.2 cents per MCF in 1966.

There is a strong suggestion implicit in this argument that the City of Edmonton was helping to cover the costs of operation in smaller centres. It also negates the argument that some advantages of increased size are available to everyone since in this case the City of Edmonton would be better off without the rest of the system.

Citing another situation, the management of Redwater Utilities Limited stated that in several cases where they have attempted to gain new franchises they have been consistently underbid by one of the International Utilities' companies.⁷ Redwater felt that their bids were 'right' and alleged that the only way that service could be provided cheaper was if the larger centres were subsidizing the more remote areas. The hypothetical example provided earlier may

have direct applicability in this situation.

If we combine the implications of the Averch and Johnson model with the pattern of growth of the major natural gas distributors in Alberta, the fact that the City of Edmonton pays more for its natural gas than is necessary and the suggestion that some bids by International Utilities for new franchises do not appear to cover costs, we are confronted with the intriguing possibility that some franchises are operating at a loss and thus resources are being misallocated.

The two major International Utilities' companies have not gone before the Board for a general revision of their rates in the past eleven years. During this time their revenues have expanded several fold but there has also been a constant and substantial flow of new capital into expansion and thus assets have expanded at a rate which has just balanced out this growth in revenues and rates have not been reduced since returns have not exceeded the permitted rate of return. It would appear that the policies of management have been those which would logically follow from the Hawkins model. For over a decade these companies have been successful in more than doubling the income to common stock equity yet in this period the approved rate of return has not been seriously surpassed and the basic rate structure has not been altered. It appears likely that the policy of the Board not to lay down any definite principles whereby it may deal with deficits or with surpluses in the rate of return has been a source of help in this matter.⁸ If a surplus does occur the Board will generally wait until the following year to determine if this is simply a temporary situation.

Hence, if management is alert it will endeavor to increase the rate base by an amount necessary to offset this. Mr. Flavin implied this when he stated that the major natural gas distributors often replace existing equipment before the end of its useful life thereby replacing depreciated equipment with new undepreciated equipment and consequently increasing the value of assets.⁹ As a result one must conclude that steady rates are not necessarily a consequence of enlightened and accurate regulation as suggested by Mr. Snyder¹⁰ of Canadian Western Natural Gas but may be a direct result of the firms attempting to maximize profits, given the rate of return constraint, by increasing revenues and assets at a balanced rate.

A Word of Caution

Much of the discussion in this chapter points to the possibility of regulatory control causing overinvestment. It is necessary to point out, however, that growth and expanded investment under regulatory constraints does not immediately mean excessive investment has occurred. There are several factors which reduce the potentiality that growth would be excessive.

There is some doubt that executives of utility companies, being businessmen like any others, would be willing to make investments in areas of low or negative returns. We may be over-estimating the sophistication of utility executives when we suggest they recognize that profits can be made by investing in low or negative return areas. While they may have an intuitive grasp of the situation, the need to

enter the capital market to finance 'overexpansion' may dampen their desires. Also the increased utilization of plant capacity, use of available natural gas, and increased specialization of services brought about by expansion may have many beneficial external effects. Thus social objectives may be met by the utility incentives to expand. Thus despite the earlier analysis that strongly suggested that the status of much of our utility investment is in doubt there are forces which may offset the tendency toward overinvestment.

FOOTNOTES

¹See Harvey Averch and Leland L. Johnson, "Behavior of the Firm Under Regulatory Constraint," American Economic Review, Vol. 52 (1962), pp. 1052-1069; S. H. Wellisz, "Regulation of Natural Gas Pipeline Companies," Journal of Political Economy, Vol. LXXI (1963), pp. 30-43; and Clark A. Hawkins, The Field Price Regulation of Natural Gas (Tallahassee: Florida State University Press, 1969).

²William G. Shepherd, "Regulatory Constraints and Public Utility Investment," Land Economics, Vol. 43 (1966), p. 348.

³In his book The Field Price Regulation of Natural Gas author C. A. Hawkins develops a model which not only supports this argument of Averch and Johnson but claims that a traditionally regulated utility must expand and there exists for it an optimum rate of growth in both sales and assets.

⁴Decision 11915 File P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company Limited for a revision of its rate schedules (June, 1949), p. 4.

⁵Ibid., p. 4.

⁶Eric J. Hanson and others, Special Gas Study Report For The City of Edmonton, Vol. I (Edmonton: City of Edmonton, 1965), p. 18.

⁷S. W. Armstrong, Vice-President, Redwater Utilities Ltd., personal interview, June 2, 1970.

⁸Decision dated March 29, 1952, File P.U. 2742. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities Limited for a revision of its customer rates, p. 16.

⁹J. E. Flavin, Pryde-Flavin Consultants Limited, personal interview, May 22, 1970.

¹⁰B. W. Snyder, Rate Engineer, Canadian Western Natural Gas Company, Limited, personal interview, May 28, 1970.

CHAPTER VI

OBSERVATIONS, CONCLUSIONS AND POLICY IMPLICATIONS

General Observations and Conclusions

The regulatory climate in Alberta has, for the most part, been calm and thus acceptable to both the public and the utility owners and managers. Generally speaking, the public has remained rather complacent and uninvolved while utility spokesmen express the opinion that Alberta has been fortunate in that the regulatory Board has reflected the best interests of not only the public but also the utility companies.

Alberta, indeed Canada, never felt the need to legally answer the question of whether to regulate or not. Consequently we avoided the bitter court struggles that characterized the early American regulatory scene. In Alberta government legislators recognized the need for regulatory control well in advance of the establishment of large privately-owned enterprises and thus philosophical differences were kept to a minimum.

Court cases arising as the result of Board decisions are conspicuous by their near absence in Alberta. It has only been on rare occasions that the public utility companies or the consumers have found themselves so opposed to a Board decision that they have seen fit to initiate court proceedings. Hence, confrontation and controversy have not played a very major role in the development of

regulatory control in Alberta.

While the regulatory climate in Alberta has indeed been placid, this relative tranquillity can not be attributed to a clear enunciation of and adherence to a set of goals or objectives. The duties and responsibilities of the Board are clearly stated in The Public Utilities Board Act but the goals and objectives behind these duties do not reveal themselves. One is struck by an apparent lack of a definite philosophical basis upon which regulatory decisions are made.

In the opinion of the author, regulatory control would be much more meaningful and objective if this control were based upon some clearly identifiable goals. Various individuals have widely diverging opinions as to what constitutes the actual goal of regulation. The elimination of abuses, the original intention of early legislators, appears to still have the majority of adherents. Others cite the need to reproduce the conditions of a competitive market as the only vital goal of regulation. Finally some indicate that the only objective of regulation should be the efficient allocation of resources and/or social objectives involving fairness in treatment of consumers, employees and owners of a public utility. Thus there is a lack of consensus concerning regulatory goals and objectives and this constitutes a definite weakness, a weakness for which the Alberta legislature must accept complete responsibility. It is imperative that any legislation controlling economic regulation contain as clear-cut a statement of objectives as is possible. The legislature must state clearly what it wants regulators to do,

thus providing guidance to the regulators, a standard against which regulatory control can be assessed and revealing explicitly what is expected of industry.

Since regulators in Alberta are not guided by any clearly discernible goals, control has generally taken the form of arbitration rather than regulation. The Board hears representation from utility companies and consumer groups and then bases its decision on the merits of the arguments presented in each case. The Board seldom initiates action and as far as the author has been able to determine its staff never engages in meaningful and directed research. Thus control becomes arbitrary and piecemeal with no one on earth in the position to unequivocally state the general objectives upon which decisions are based.

The role of arbitrator rather than regulator may not be totally attributable to the lack of objectives to guide the Board but may, in part, be a natural consequence of the many and diversified responsibilities over which the Board has jurisdiction. It has jurisdiction over numerous public utilities including natural gas, electric power and telephone services which in themselves should provide a formidable task for regulators; the Board has jurisdiction in all expropriation matters whereby it determines fair rates of compensation if agreement between parties has not been reached; and the Board has power to make such regulations and orders as it deems necessary in controlling the production, processing, supplying, transportation, distribution or sale of milk and/or cream within the Province of Alberta. Given such

a wide variety of responsibilities it becomes obvious why the Board has become an arbitrator rather than a participant in the game of regulation.

Concurrent with the problem of wide responsibilities is an apparent inadequacy in the number of staff personnel. The Board employs two chartered accountants, a secretary to the Board and a handful of office secretarial personnel. Little thought is required to realize that all of the available manpower must be tied down in processing and reviewing routine matters. Obviously precious little time can be left to perform the tremendously complex tasks of regulation.

Finally the general observation must be made that regulation in Alberta has become slow, cumbersome and characterized by near mystic rituals. Regulation is dominated by rate hearings, generally adversary proceedings, at which all parties insist on their right to be fully heard. Everyone concerned enacts the same scene over and over again with the outcome being an almost foregone conclusion. While regulation is not an easy task it is doubtful if it need to be as cumbersome a tool as that which has been developed by the various participants in the regulatory process.

Specific Observations and Conclusions

The method of calculating the rate base, original cost minus accrued depreciation, while admittedly weak in some ways, appears to serve its function quite well. The original cost method of deter-

mining the rate base is simple and allows for easy calculation. The problem of equity or fairness to investors appears to have been alleviated by transferring the question of inflation to the rate of return. The practice of deducting accrued depreciation from the rate base creates the anomaly that a utility has an incentive to continually expand its rate base. Other methods of dealing with depreciation, however, present as many, and possibly more, complex problems, thus the present method would be adequate if the Board were to take a more active role in the determination of investment decisions.

The Board considers that its major duty is the fixing of just and reasonable rates. The manner in which they do this is to determine the revenue requirements of the enterprise thus the method of calculating the rate base becomes immaterial and the rate of return assumes greater importance. The consideration of this value consumes the major part of any regulatory hearing. Great reams of evidence, studiously prepared and presented, are offered to the Board for consideration. For days, even weeks, the utility company representatives and consumer respondents argue over one concept--the cost of equity capital. In the end the Board makes a decision and readily admits that the rate of return arrived at is a judgement figure. At best this exercise can be described as humorous, at worst, as futile.

The objective followed by the Board, in establishing the rate of return, is that, "the rate must be such as will enable the company to maintain its financial integrity" ¹ Financial integrity is

generally taken to mean that the firm remains financially solvent and able to attract capital whenever required.

The full-blown rate hearing with its procedural wrangling and contradicting evidence at which these rates are decided does not seem conducive to rational decision making. In my opinion some form of continuous surveillance of the appropriateness of the rate of return would be much more reasonable. "Briefly, continuous surveillance is a system of informal but constant review of utility operations by means of appropriately designed accounting and financial reports."² The Board could arrange periodic meetings with itself, company representatives and interested consumer groups in attendance. The appropriateness of the rate of return could be considered under informal conditions thus avoiding the cold judicial procedures employed at rate hearings. Continual contact between company and consumer representatives could have the effect of developing understanding, building trust and reducing the need for long hearings and possible litigation.

As indicated earlier, the price consumers pay for their natural gas is largely a function of the operating expenses experienced by the distributor. For this reason it is imperative that regulators have a thorough knowledge of the expenses incurred by the utility companies. The practice of allowing managerial judgement in most cases should, at the very least, be supplemented with intelligent supervision by the Board. The Board should compare costs with other comparable enterprises and seriously study the need for many

of the service and advertising expenses incurred by these enterprises. The difficulty in comparing costs, presented by virtue of the fact that the gas distributing industry in Alberta is a near monopoly, is recognized but it does not negate the need for such study.

Regulation of the type that restricts return on investment to a particular level generally forces industry to become interested in cost-saving technology but it also becomes apparent that much managerial energy is channelled into attempts to persuade regulatory authorities that rate increases or increases in the rate of return are necessary. A great deal of time is spent considering the reasonableness of the rate of return but little time is spent considering the reasonableness of costs and what exactly are the standards of reasonableness that are being employed. Lacking any thoroughly trustworthy standards, one is left with the feeling that under more competitive conditions costs might be considerably lower. Consequently I maintain that the Board must become vitally interested in costs of wages and salaries, advertisements and public services. These costs should be investigated, publicized and closely observed.

In the area of rates, the level of rates (how much the utility may receive from the sale of all its services), as distinct from the structure of rates (the distribution of the total payment among the several classes of users), has been regulation's greatest concern.³

This statement typifies exactly the Alberta situation. The Board spends a great deal of time at rate hearings worrying about the components which determine the level of rates. The utility companies are then entrusted to set the structure of rates, that is, individual

rates to different consumers, and only upon complaint will the Board seriously review these rates. The Board has not shown any indication that it understands the manner in which the rate structure can affect the allocation of resources and consequently has devoted no time to studying the problem. I consider this to be one of the most vital issues facing the Board today.

Consumers in a given locality are not in a position to compare the natural gas rates of the company supplying them with those of a competitive enterprise since such an enterprise can not legally exist. Consumers are told that differences in rates between communities result from differences in customer, commodity and demand costs. This is, of course, an argument that the average consumer can not disprove since he has no basis for comparison. Hence, this is an area where Board initiative is required. The Board must become deeply involved in the analysis of costs so that it will be in a better position to judge whether certain rates are unduly discriminatory or not. Discriminatory pricing policies must be carefully scrutinized in order to ascertain whether all areas are at least covering their incremental costs of service because anything less does not make economic or ethical sense. Board emphasis must focus on the issues of allocation and the promotion of distributive justice.

The concern expressed in Chapter V involving the possibility of over-investment is deeply related to the need to analyze costs and cost distribution more closely. While firm empirical evidence in support of the possibility of over-investment is lacking that which

is available indicates that we need to review our long standing indicators of success in the utility and regulatory field. Continuous expansion into new markets, the development of capital-intensive innovations and diversification of services has generally been justified on an economic basis but I feel that there is a definite possibility that these may be an indication of over-investment. The major International Utilities' companies have recently expanded into communities having no physical link with the rest of their network. The only economies that could be gained by expanding into these communities would result from allocating managerial costs over a larger system. The effects of this must necessarily be very small and thus the argument that the major distributors have expanded in order to take advantages of economies of scale must be greatly weakened, consequently the Averch-Johnson explanation of growth under regulation is greatly strengthened.

This suggests that the Board should become more closely involved in the supervision of operating expenses and investment decisions. In particular, the Board should study new franchise bids by comparing costs and rates of the various companies and further attempt to ascertain which company could provide the most attractive package of service, safety and price. If this were done it would reduce the possibility of large established firms being able to underbid smaller firms in competing for new franchises even when the latter may be the more efficient. Thus the Board should become more deeply involved in the awarding of new franchises in areas

receiving natural gas service for the first time.

The degree of seller concentration in the Alberta natural gas distributing industry is extremely high. The result being that the vast majority of the major rate hearings that the Board conducts are with International Utilities, Limited. The Board has no basis for comparison with other major distributors and thus this one control unit has tremendous influence on regulatory control in Alberta. It is, of course, impossible to quantify the exact extent of this influence but I contend that it is very considerable.

This peculiar organizational structure of the major natural gas distributors in Alberta presents some questions which the Board should consider. International Utilities, Limited, as revealed earlier, has controlling interest in the three major natural gas distributors in Alberta. Yet at rate hearings the Board meets the individual corporations and treats each one as a separate entity. A great deal of rhetoric is presented at these rate-cases concerning the cost of equity capital. It may be interesting at this time to ask, "cost to whom?" The actual owner of this capital is International Utilities so would it not seem reasonable that when, for example, Northwestern Utilities applies for a rate increase the financial position of International Utilities is considered? If it can be shown that International Utilities is doing well then possibly if one of the firms controlled by this corporation is granted a rate increase another should reduce its rates.⁴ International Utilities should not be allowed to engage in separate regulatory hearings via

each of its three constituent corporations when in fact they represent one economic unit. The organizational structure of the companies must never leave our minds and it is time that the Board begins to treat the three major gas distributors as parts of a whole and not as separate entities.

Policy Implications

A regulatory Board should, at all times, know what it is doing, where it is going and why it is heading in that direction. At present the Board carries out its duties in accord with its interpretation of the Act and its major purpose would appear to be the avoidance of major abuses. Thus the Board knows what it is doing but it is doubtful if it knows where it is going. The author considers this a major weakness and one that needs to be rectified since without clearly stated and easily understood goals in sight, regulation will continue to flounder from situation to situation without a long term purpose in mind. Ben Lewis sums this up beautifully when he states:

Regulation needs refinement and precision, of course, but its need for these is dwarfed by its need for a clear sense of purpose and direction--what it is trying to do and why it is trying to do it. It is not difficult to plot a straight, sure path for regulation but, to follow it, regulation must first be gotten out of the woods.⁵

In addition to 'getting out of the woods', I suggest that the Board should reassert its duty to regulate. Regulation must become more businesslike and functional with reliance placed upon records, reports and continuous surveillance. The Public Utilities Act gives the Board the right to hire experienced and expert personnel yet it

Less emphasis must be given to the highly ritualistic rate-hearings with their many trappings and failings. Continuous surveillance would make the Board much more conscious of the various conceptual and theoretical principles governing utility companies since under these circumstances consideration of same would not be limited to the periodic rate-hearings.

Regulation of this type would, of course, require the keeping of extensive records and the hiring of a relatively large and experienced staff. Personnel should not be limited to chartered accountants capable of keeping records but also include research personnel, engineers and/or economists, who would involve themselves in research in such areas as allocation of joint costs, determination of costs for individual services and evaluation of utility and regulatory performance in the light of allocation within the entire economy. The cost of good regulation would necessarily be high. It may even be more expensive than regulation by major rate-case hearings but it would also be more objective, and hopefully, more effective.

The Board must recognize that the public is entitled to the most efficient utility service possible. Thus the entire utility operation including organization, finances, investments, rates and costs must be of concern to the regulatory Board. Board involvement in these aspects of the operation can not be considered interference in the domain of management since the Board's duty is to see that the public gets what it wants and at the lowest possible price. This

should not be taken as an indication that regulation has been totally unsuccessful in the past but simply as an assertion that regulation has not been as successful as some people suggest.

Suggestions for Further Research and Analysis

This thesis probably raises more questions than it answers thus numerous areas requiring further research have undoubtedly become obvious to the reader.

Consideration of the contemporary goals of regulation will in all likelihood not occur unless economists take up the mantle. A thorough discussion of all the possible goals of regulation, however, is needed and would serve a very useful purpose.

An in depth analysis of the importance of economies of scale in the natural gas distributing industry is vital and necessary. Economies of scale may be important within a particular size of market but as the market grows the point may be reached where unit costs begin to increase. Furthermore new technological innovations may dictate smaller, or larger, optimum sizes of distribution systems.

Determination of the optimal scale of operation is especially important in Alberta since the large, high-growth centres of Calgary and Edmonton are being served by monopolists whose franchises were first gained in 1911 and 1923, respectively. It may well be that these systems are well past optimal size and that these centres would be better served by several systems. We must not assume that the present structure of the industry can be justified by economies of

scale or that the economies of scale will be experienced indefinitely.

Pricing policies as pursued by the utility companies offers an interesting field for research. Peter Wiles suggests, ". . . that 'public utility' pricing is arbitrary",⁶ yet utility firms suggest that their prices are 'fair' and 'scientific'. It would be interesting and useful to find out exactly how utility prices are determined and furthermore consider the allocative effect of these prices.

Finally research must be expanded to determine the existence and/or extent of below-cost services. This possibility of over-investment under regulated conditions might be approached by a detailed cost analysis. This would involve one immediately in the complex problem of determining joint-costs and thus is added another area requiring continued research.

FOOTNOTES

¹Decision 11915 File: P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, p. 26.

²William G. Shepherd and Thomas G. Gies (eds.), Utility Regulation (New York: Random House, 1966), p. 108.

³Ibid., p. 232.

⁴Ibid., pp. 226-227.

⁵Ibid., p. 248.

⁶Peter J. D. Wiles, Price, Cost and Output (Oxford: Basil Blackwell, 1961), p. 112. *Italics included in original text.*

·SELECTED BIBLIOGRAPHY

BIBLIOGRAPHY

Books

- Adelman, M. A. The Supply and Price of Natural Gas. Oxford: Basil Blackwell, 1962.
- Bain, Joe S. Industrial Organization. New York: John Wiley and Sons, Inc., 1959.
- Barnes, Irston R. The Economics of Public Utility Regulation. New York: F. S. Crofts and Company, 1942.
- Bonbright, James C. Principles of Public Utility Rates. New York: Columbia University Press, 1961.
- Cavers, David F. and James R. Nelson. Electric Power Regulation in Latin America. Baltimore: The Johns Hopkins Press, 1959.
- Clemens, Eli Winston. Economics and Public Utilities. New York: Appleton-Crofts, Inc., 1950.
- Commons, John R. Legal Foundations of Capitalism. Madison: The University of Wisconsin Press, 1959.
- Cushman, Robert E. The Independent Regulatory Commission. London: Oxford University Press, 1941.
- Davidson, Ralph Kirby. Price Discrimination in Selling Gas and Electricity. Baltimore: The Johns Hopkins Press, 1955.
- Fesler, James W. The Independence of State Regulatory Agencies. Chicago: Public Administration Service, 1942.
- Garfield, Paul J., and Wallace F. Lovejoy. Public Utility Economics. Englewood Cliffs: Prentice-Hall Inc., 1964.
- Gould, Jacob M. Output and Productivity in The Electric and Gas Utilities. New York: University Press, 1946.
- Hawkins, Clark A. The Field Price Regulation of Natural Gas. Tallahassee: Florida State University Press, 1969.
- Leeston, Alfred M., John A. Crichton, and John C. Jacobs. The Dynamic Natural Gas Industry. Norman, Oklahoma: University of Oklahoma Press, 1963.

- Levin, Harvey J. (ed.). Business Organization and Public Policy. New York: Rinehart and Company Inc., 1958.
- Means, Gardener C. Pricing Power and The Public Interest. New York: Harper Brothers, 1962.
- Metcalf, Lee, and Vic Reinemer. Overcharge. New York: David McKay Company, Inc., 1967.
- Mund, Vernon A. Government and Business. 4th ed. New York: Harper and Row Publishers, 1960.
- Pegrum, Dudley F. Public Regulation of Business. Revised Edition. Homewood: Richard D. Irwin Inc., 1966.
- Phillips, Charles F. The Economics of Regulation. Homewood: Richard D. Irwin Inc., 1965.
- Sariol, Paul. The Nationalization of Electric Power. Montreal: The Harvest House, 1962.
- Shepherd, William G., and Thomas G. Gies (eds.). Utility Regulation. New York: Random House, 1966.
- Tiratso, E. N. Natural Gas. London: Scientific Press Ltd., 1967.
- Troxel, Emery. Economics of Public Utilities. New York: Rinehart and Company Inc., 1947.
- Warren, Charles. The Supreme Court in United States History. Volume 2. Boston: Little, Brown and Company, 1922.
- Wilcox, Clair. Public Policies Toward Business. 3rd ed. Homewood: Richard D. Irwin Inc., 1966.
- Wiles, Peter J. D. Price, Cost and Output. Oxford: Basil Blackwell, 1961.
- Wilson, Lloyd G. (ed.). Ownership and Regulation of Public Utilities. Philadelphia: The Annals of the American Academy of Political and Social Science, 1939.

Journal Articles

- Adams, Walter. "The Role of Competition in Regulated Industries," American Economic Review: Papers and Proceedings, Vol. 48 (1958), pp. 527-543.
- Averch, Harvey, and Leland L. Johnson. "Behavior of The Firm Under Regulatory Constraint," American Economic Review, Vol. 52 (1962), pp. 1052-1069.
- Bonbright, James C. "Public Utility Financing as Affected by Rate Regulation," Public Utilities Fortnightly, Vol. 69 (1962), pp. 649-659.
- Boyd, Alan S. "Inflation and Public Utility Regulation," Public Utilities Fortnightly, Vol. 64 (1959), pp. 541-545.
- Brown, H. G. "Railroad Valuation and Rate Regulation," Journal of Political Economy, Vol. 33 (1925), pp. 505-530.
- Caves, Richard E. "Direct Regulation and Market Performance in the American Economy," American Economic Review: Papers and Proceedings, Vol. 54 (1964), pp. 172-181.
- Chamberlin, Edward H. "Proportionality, Divisibility and Economies of Scale," Quarterly Journal of Economics, Vol. 62 (February, 1948), pp. 229-257.
- Cramton, Roger C. "The Effectiveness of Economic Regulation: A Legal View," American Economic Review: Papers and Proceedings, Vol. 54 (1964), pp. 182-191.
- Gramm, Warren S. "The Public Utility Scissors and Economic Policy," Land Economics, Vol. 38 (1962), pp. 22-31.
- Gray, Horace M. "The Passing of the Public Utility Concept," Land Economics, Vol. 16 (1940), pp. 8-20.
- Greenhut, M. L. "On The Question of Realism in Economic Theory and The Regulation of Public Utilities," Land Economics, Vol. 42 (1966), pp. 260-267.
- Gruehn, Herman L. "Utility Problems During Inflation," Public Utilities Fortnightly, Vol. 63 (1959), pp. 91-101.
- Guereken, C. P. "The Economic Consequences of Regulation," Public Utilities Fortnightly, Vol. 61 (1958), pp. 819-835.

- Hughes, William R. "Short-run Efficiency and the Organization of the Electric Power Industry," Quarterly Journal of Economics, Vol. 76 (1962), pp. 592-612.
- Jackson, A. B. "The Determination of Fair Return for Public Utilities," Canadian Public Administration, Vol. 7 (1964), pp. 343-359.
- Keyes, Lucile S. "The Protective Function of Commission Regulation," American Economic Review: Papers and Proceedings, Vol. 48 (1958), pp. 544-552.
- Kolb, Burton A. "The Rise and Fall of Public Utilities: An Appraisal of Risk," Journal of Business, Vol. 37 (1964), pp. 329-345.
- Lerner, Abba P. "Conflicting Principles of Public Utility Price Regulation," Journal of Law and Economics, Vol. 7 (1964), pp. 61-70.
- Lewis, Ben W. "Ambivalence in Public Policy Toward Regulated Industries," American Economic Review, Vol. 53 (1963), pp. 39-46.
- Lovejoy, Wallace F., and David A. Bowers. "Cyclical Sensitivity of Public Utilities 1947-1959," Land Economics, Vol. 38 (1962), pp. 327-340.
- McAllister, Breck P. "Lord Hale and the Business Affected With a Public Interest," Harvard Law Review, Vol. 43 (1930), pp. 759-791.
- Morrissey, F. P. "Evaluation of Public Regulation," American Economic Review: Papers and Proceedings, Vol. 48 (1958), pp. 564-567.
- _____. "Power and Public Utility Problems," American Economic Review: Papers and Proceedings, Vol. 49 (1959), pp. 403-445.
- _____. "Impact of Inflation on Public Utility Regulation," Public Utilities Fortnightly, Vol. 65 (1960), pp. 625-627.
- Morton, Walter A. "Creative Regulation," Land Economics, Vol. 39 (1963), pp. 367-374.
- Olds, Leland. "The Economic Planning Function Under Public Regulation," American Economic Review: Papers and Proceedings, Vol. 48 (1958), pp. 553-561.
- Olson, M., and David McFarland. "The Restoration of Pure Monopoly and The Concept of The Industry," Quarterly Journal of Economics, Vol. 76 (1962), pp. 613-631.

- Robinson, G. H. "The Public Utility Concept in American Law," Harvard Law Review, Vol. 41 (1928), pp. 277-308.
- Shepherd, William G. "Regulatory Constraints and Public Utility Investment," Land Economics, Vol. 43 (1966), pp. 348-354.
- Smith, Howard R. "The Rise and Fall of The Public Utility Concept," Land Economics, Vol. 23 (1947), pp. 117-131.
- Welch, Francis X. "Current Fallacies in Regulation," Public Utilities Fortnightly, Vol. 66 (1960), pp. 16-24.
- Wellisz, S. H. "Regulation of Natural Gas Pipelines," Journal of Political Economy, Vol. 71 (1963), pp. 30-43.
- Zajac, E. E. "A Geometric Treatment of Averch-Johnson's Behavior of the Firm Model," American Economic Review, Vol. 60 (March, 1970), pp. 117-125.

Government Publications

- Alberta Bureau of Statistics. Alberta Industry and Resources 1968. Edmonton: The Queen's Printer, 1968.
- Dominion Bureau of Statistics. Canada Yearbook. Ottawa: The Queen's Printer, 1965-69.
- _____. Gas Utilities. Ottawa: The Queen's Printer, Catalogue No. 57-205, 1961-66.
- Economic Council of Canada. Second Annual Review. Ottawa: The Queen's Printer, 1965.
- _____. Sixth Annual Review. Ottawa: The Queen's Printer, 1969.
- Government of The Province of Alberta. Statutes of Alberta. Edmonton: The Queen's Printer, 1915-1969.
- _____. The Gas Utilities Act. Edmonton: The Queen's Printer, 1964.
- _____. The Public Utilities Board Act. Edmonton: The Queen's Printer, 1966.

Decisions of The Public Utilities Board

Decision 11915 File: P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, 1949.

Decision 12189 File: P.U. 2551. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, 1949.

Decision dated July 26, 1951, File: P.U. 2742. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a variation of its rates, 1951.

Decision dated March 29, 1952, File: P.U. 2742. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its customer rates, 1952.

Decision 23616 File: P.U. 2551-1. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Canadian Western Natural Gas Company, Limited for a revision of its rate schedules, 1959.

Decision 23965 File: P.U. 2742-2. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its rate schedules, 1959.

Decision 24138 File: P.U. 2742-2. IN THE MATTER OF "The Public Utilities Act": AND IN THE MATTER OF an application by Northwestern Utilities, Limited for a revision of its customer rates, 1959.

Decision 26425 File: P.U. 5134-1. IN THE MATTER OF "The Gas Utilities Act": AND IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Northland Utilities, Limited, 1963.

Decision 27014 File: P.U. 187-A. IN THE MATTER OF "The Town and Village Act": AND IN THE MATTER OF "The City Act": AND IN THE MATTER OF an application by the City of Grande Prairie for the fixing of a price at which certain apparatus and property of Northland Utilities, Limited situated within the aforesaid City may be taken over by the City, 1965.

Decision 27999 File: P.U. 7349-3. IN THE MATTER OF "The Alberta Government Telephones Act": AND IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Alberta Government Telephones for a revision of its rate schedules, 1966.

Decision 28075 File: P.U. 187-A. IN THE MATTER OF "The Town and Village Act": AND IN THE MATTER OF "The City Act": AND IN THE MATTER OF an application by the City of Grande Prairie for consent to purchase certain apparatus and property of Northlan Utilities, Limited situated in the aforesaid City and an Order fixing the terms thereof, 1967.

Decision 28085 File: P.U. 7349-3. IN THE MATTER OF "The Alberta Government Telephones Act": AND IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Alberta Government Telephones for a revision of its schedules of rates, tolls and charges, 1967.

Decision 29547 File: P.U. 3751-1. IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Canadian Utilities, Limited for a revision of its rates to be charged to its customers for electric energy, 1969.

Decision 29845 File: P.U. 3751-1. IN THE MATTER OF "The Public Utilities Board Act": AND IN THE MATTER OF an application by Canadian Utilities, Limited for a revision of its rates to be charged to its customers for electric energy, 1970.

Reports - Published

Canadian Western Natural Gas Company, Limited. Annual Report.
CALGARY: CWNG, 1915-69.

Hanson, Eric J., and others. Special Gas Study Report for The City of Edmonton. 2 Vols. Edmonton: City of Edmonton, 1965.

Northwestern Utilities, Limited. Annual Report. Edmonton: NUL, 1923-69.

Weinrich, John E. Economic Impact of The Canadian Gas Industry: Local, Provincial and Regional. Calgary: Calgary Chamber of Commerce, 1966.

Unpublished Material

Alberta Public Utilities Board. "Duties and Responsibilities of The Public Utilities Board," Edmonton, 1967. (Mimeographed)

APPENDIX A

TABLE A-1

CAPITAL AND REPAIR EXPENDITURES FOR CERTAIN ECONOMIC SECTORS 1961-1966
(Millions of Dollars)

YEAR	UTILITIES	TOTAL ECONOMY	UTILITIES AS PERCENTAGE OF TOTAL
1961	2,421.5	11,193	21.6
1962	2,334.1	11,876	20.9
1963	2,545.6	12,749	20.0
1964	2,880.6	14,575	19.8
1965	3,271.6	16,792	19.5
1966	3,831.0	19,066	20.0

SOURCE: Canada Yearbooks, 1963-68

TABLE A-2

WAGES AND SALARIES PAID TO EMPLOYEES OF UTILITY FIRMS 1961-1966
(Millions of Dollars)

YEAR	UTILITIES	TOTAL ECONOMY	UTILITIES AS PERCENTAGE OF TOTAL
1961	357	18,176	1.96
1962	378	19,390	1.95
1963	397	20,674	1.92
1964	421	22,507	1.87
1965	455	25,061	1.81
1966	486	28,125	1.73

SOURCE: Canada Yearbooks, 1963-68

TABLE A-3

REVENUE FROM SALES OF NATURAL GAS IN CANADA 1961-1966

YEAR	TOTAL SALES (MCF)	TOTAL REVENUE (Dollars)	REVENUE PER CUSTOMER
1961	380,322,977	\$227,261,041	\$184.91
1962	412,061,509	257,659,680	196.97
1963	451,598,298	287,686,684	205.91
1964	504,503,388	327,982,720	223.89
1965	573,016,223	369,306,826	241.54
1966	635,514,622	416,212,202	261.81

SOURCE: D.B.S., Gas Utilities, #57-205, 1961-1966.

TABLE A-4

REVENUE FROM SALES OF NATURAL GAS IN ALBERTA 1961-1966

YEAR	TOTAL SALES (MCF)	TOTAL REVENUE (Dollars)	REVENUE PER CUSTOMER
1961	149,285,446	\$ 42,003,514	\$198.19
1962	150,914,154	45,141,763	200.74
1963	156,705,713	48,309,442	205.04
1964	160,828,728	51,469,385	209.43
1965	174,228,007	56,332,478	220.45
1966	184,848,263	59,564,857	226.15

SOURCE: D.B.S., Gas Utilities, #57-205, 1961-1966.

APPENDIX B

TABLE A-5
OFFICIALS OF THE ALBERTA PUBLIC UTILITIES BOARD
FROM 1915 TO THE PRESENT

<u>Name</u>	<u>Term</u>	<u>Years in Office</u>
G. V. H. BULYEA	1915 - 1923	8
A. A. CARPENTER	1915 - 1939	24
JOHN STOCKS	1915 - 1916	1
F. M. BLACK	1916 - 1918	2
E. J. FREAM	1923 - 1934	11
G. M. BLACKSTOCK	1939 - 1953	14
B. V. MASSIE	1946 - 1951	5
C. J. D. BAINES	1951 - 1957	6
R. D. HENDERSON	1952 - 1966	14
G. H. ROSE	1953 - 1957	4
W. NOBBS	1957 -	13
W. J. MAJOR	1958 - 1961	3
K. J. LEATHEM	1962 -	8
W. D. ABERCROMBIE	1968 -	2

SOURCE: Alberta Public Utilities Board

APPENDIX C

This is Schedule "A" to the Decision of
The Board of Public Utility Commissioners
in the matter of an application by
Canadian Western Natural Gas Company
Limited for an increase in rates charged
for natural gas supplied to its customers,
dated the Fourth day of March, 1959.

CALCULATION OF THE RATE BASE

	<u>1958</u>	<u>1959</u>
Estimated property, plant and equipment at year end	\$44,957,402.00	\$50,175,152.00
Less: Accumulated Amortization	9,854,872.00	10,662,504.00
Contributions for Extensions	191,508.00	191,508.00
	<u>\$34,911,022.00</u>	<u>\$39,321,140.00</u>
Add previous year balance	24,893,445.00	34,911,022.00
	<u>\$59,804,467.00</u>	<u>\$74,232,162.00</u>
1/2 thereof	\$29,902,233.00	\$37,116,081.00
Working Capital Allowance	<u>1,500,000.00</u>	<u>1,500,000.00</u>
Rate Base	<u>\$31,402,233.00</u>	<u>\$38,616,081.00</u>