CHEMICAL HERITAGE FOUNDATION

GEORGE W. GOVIER

Transcript of an Interview
Conducted by

James G. Traynham

at

Calgary, Alberta, Canada

on

7 May 1997

(With Subsequent Corrections and Additions)

CHEMICAL HERITAGE FOUNDATION
Oral History Program
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Dr. George W. Govier

(Date) 15 June 97

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Chemical Heritage Foundation
Oral History Program
315 Chestnut Street
Philadelphia, Pennsylvania 19106

GEORGE W. GOVIER

1917 Born in Nanton, Alberta, Canada, on 15 June

Education

1939 B.A.Sc., chemical engineering, University of British Columbia
1945 M.Sc., physical chemistry, University of Alberta
1949 Sc.D., chemical engineering, University of Michigan

Professional Experience

Standard Oil Company of British Columbia, Vancouver, British Columbia
1939-1940 Plant Operator
1941 Office Engineer

1940-present Consultant

University of Alberta, Alberta, Canada
1940-1942 Lecturer
1942-1948 Assistant Professor
1948-1963 Professor
1948-1959 Head, Department of Chemical and Petroleum Engineering
1959-1963 Dean, Faculty of Engineering

Aluminum Company of Canada, Arvida, Quebec
1942 Design Engineer

Oil and Gas Conservation Board, Alberta, Canada
1945 Special Studies Engineer

Energy Resources Conservation Board, Alberta, Canada
1948-1959 Member
1949-1962 Deputy Chairman
1962-1975 Chairman
1977-1978 Chairman

University of Calgary, Alberta, Canada
1963-1975 Professor

	Petroleum Recovery Institute
1966-1979	Board of Directors
1976-1979	Vice-President
	Alberta Helium Limited (later International Permeation Inc.)
1973-1990	Chairman, Board of Directors
1985-1990	Managing Director
	Department of Energy and Natural Resources, Alberta, Canada
1975-1977	Chief Deputy Minister
	Coal Mining Research Centre
1977-1978	Chairman, Policy Committee
1978-1979	Vice-President
1978-present	President, Govier Consulting Services Ltd., Alberta, Canada

Honors

1964	R. S. Jane Memorial Award, Chemical Institute of Canada
1964	Award of Merit, Canadian Natural Gas Processing Association
1967	Sesquicentennial Award, University of Michigan
1967	Centennial Medal of Canada
1970	Centennial Award, Association of Professional Engineers, Geologists, and Geophysicists of Alberta
1971	Selwyn G. Blaylock Medal, Canadian Institute of Mining and Metallurgy
1976	Honorary Doctor of Laws, University of Calgary
1976	Gold Medal, Canadian Council of Professional Engineers
1976	Achievement Award, Government of Alberta
1978	Named “Oil Man of the Year” by *Oilweek Magazine*
1981	Doctor of Science, honoris causa, McGill University
1985	Doctor of Engineering, honoris causa, University of Waterloo
1986	Distinguished Services Medal, Petroleum Society of CIM
1987	Sir John Kennedy Medal, The Engineering Institute of Canada
1989	Anthony F. Lucas Gold Medal, Society of Petroleum Engineers of AIME
1992	Half Century of Membership Award, American Institute of Chemical Engineers

ABSTRACT

George Govier begins the interview with a discussion of his family background and youth. Govier grew up in Canada, the son of a business owner. While in high school, he developed a strong interest in chemistry, mathematics, and physics, and decided to pursue chemical engineering because it combined many of these interests. Govier attended the University of British Columbia, where he earned his B.A.Sc. in chemical engineering in 1939. After graduation, he accepted a position with Standard Oil of British Columbia. A year later, he became an instructor at the University of Alberta, and began his graduate studies, receiving his M.Sc. in physical chemistry in 1945. As he had summers off from teaching, Govier took short-term positions with Standard Oil, the Aluminum Company of Canada, and the Petroleum and Natural Gas Conservation Board. During this time, he also took a brief leave from the University of Alberta to pursue his doctoral studies at the University of Michigan; he received his Sc.D. in chemical engineering in 1949. In 1948, Govier became the head of the University of Alberta's Department of Chemical and Petroleum Engineering, and was instrumental in developing the program there. Eleven years later, he accepted the position of dean of the Faculty of Engineering, a position which he held until his departure from the University of Alberta. Govier then became the chairman of the Petroleum and Natural Gas Conservation Board, an organization in which he had been active since 1948. He discusses the activities of the board, his involvement in various professional organizations, and his consulting experiences. Govier concludes the interview with his thoughts on the future of the petroleum industry in North America.

INTERVIEWER

James G. Traynham is a Professor of Chemistry at Louisiana State University, Baton Rouge. He holds a Ph.D. in organic chemistry from Northwestern University. He joined Louisiana State University in 1963 and served as chemistry department chairperson from 1968 to 1973. He was chairman of the American Chemical Society's Division of the History of Chemistry in 1988 and is currently councilor of the Baton Rouge section of the American Chemical Society. He was a member of the American Chemical Society's Joint-Board Council on Chemistry and Public Affairs, as well as a member of the Society's Committees on Science, Chemical Education, and Organic Chemistry Nomenclature. He has written over ninety publications, including a book on organic nomenclature and a book on the history of organic chemistry.

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INTERVIEWER: James G. Traynham

LOCATION: Calgary, Alberta, Canada

DATE: 7 May 1997

TRAYNHAM: Dr. Govier, I know you were born on June 15, 1917. Can you tell me something about your parents and your early childhood?

GOVIER: Yes. I was born in Nanton, Alberta. Nanton is a small town just south of Calgary, about fifty miles. My father owned a small general store in Nanton.

TRAYNHAM: What were your parents' names?

GOVIER: My father was George Arthur Govier; my mother's maiden name was Gertrude Wheeler.

TRAYNHAM: You carry both parent names in your own name, then.

GOVIER: At home I was always referred to by my middle name, Wheeler, because my father was George. As I grew up, I became known as George.

TRAYNHAM: What was your father's business in Nanton?

GOVIER: Well, he ran a small general store—retail merchandising.

TRAYNHAM: You went to school in Nanton?

GOVIER: No. My father did quite well in Nanton. Then, he and Mother decided to move farther west. They moved to Penticton, and he opened a store there. I started school in Penticton. Penticton is a town in central southern BC [British Columbia].

TRAYNHAM: All right. You went to school in British Columbia, where your family had moved. Did you graduate from high school there?

GOVIER: No, not quite. We didn't stay too long in Penticton. Dad's business didn't do well, and eventually he sold out. I was, I guess, in about grade two. We moved to Vancouver. Dad had trouble finding a job. This was not the best time. Let me see, I would have been about eight. It would have been about 1924 or 1925, somewhere in there. Dad finally got a job working for a men's furnishings store. Of course, I continued school there. I went to General Gordon School in the Kitsilano district of Vancouver. I met the girl who was to become my wife in grade four. I continued through public school at General Gordon, then moved to high school at King Edward High and graduated from high school in 1934 or 1935. Then, I went on to the University of British Columbia.

TRAYNHAM: Do you have any particular recollections of high school studies? Was it in high school that you became interested in chemical engineering?

GOVIER: Yes, it was. I was always interested in physics, math, and chemistry. As I went through high school, I could see that the field of chemical engineering—which was rather new at that time—combined elements of math, physics, and chemistry, so it appealed to me even from high school days.

TRAYNHAM: You knew what you wanted to major in when you went to the University of British Columbia, then.

GOVIER: Yes, I did.

TRAYNHAM: Was there actually a department of chemical engineering at British Columbia then?

GOVIER: No, it wasn't a full-fledged department. At UBC, the structure was a Faculty of Applied Science, which included the engineering departments—and nursing, strangely enough, it being an applied science. There was a professor of chemical engineering, but not a full-fledged department.

TRAYNHAM: You took, I presume, all the chemical engineering courses they had to offer?

GOVIER: Yes, I did. There was quite a variety of courses in chemistry, also—not too many in chemical engineering itself. This was the time when the concept of unit operations was just being developed. Our professor, whose name was W. F. Seyer, was very keen on the idea of unit operations. Our chemical engineering instruction was almost exclusively in that area.

TRAYNHAM: Then, when you graduated, what did you do with your education in chemical engineering?

GOVIER: What I did was look for a job. I graduated in 1939. Jobs were very scarce. I was finally fortunate to get a job with Standard Oil Company of British Columbia. Standard of BC operated a very small, almost teakettle refinery on the outskirts of Vancouver. I got a job with them really as a trainee engineer. I wasn't doing any engineering or technical work at all. In fact, much of my work was more laboring than engineering—least of all chemical engineering. I remember very, very clearly the distaste I had for one of my functions, which was to steam out and clean recycled oil barrels. I was on shift work. It was an education in itself, but hardly in engineering.

TRAYNHAM: Had you been strongly oriented toward the petroleum industry before finding that job?

GOVIER: No, I hadn't. I hadn't really thought much about the petroleum industry; but having had that experience or that contact with the refining industry, all aspects of the petroleum industry appealed to me. I decided that if I was going to go ahead in the chemical industry or the refining industry, the best thing for me to do was to move my education forward.

I subscribed to a trade magazine published by McGraw-Hill. I don't know whether they still publish it. It was called *Chemical Engineering*—just that name. It was a trade magazine. One day, I noticed an advertisement from the University of Alberta in Edmonton, Alberta. They were looking for—I'm not sure if it was an instructor or a demonstrator; anyway, a very lowly-paid position—in chemical engineering. I inquired and found that I would be eligible for the job; at the same time, I could start work toward a master's degree in chemistry.

I applied for and got the job, and we moved to Edmonton in the fall of 1940. I was only with Standard of BC for one year.

TRAYNHAM: Had you married while you were in college, or just upon graduation?

GOVIER: No. We married in the spring of 1940.

TRAYNHAM: All right. This would have been just before you moved to Alberta, then. Did you take up responsibilities both as an instructor and as a student at Alberta at the same time, or was there a lapse of years?

GOVIER: Well, there was a lapse of years. I found when I got to Alberta that the dean, whose name was R. S. L. Wilson, was counting on me to develop and give the principal course in chemical engineering. Like BC, Alberta didn't have a formal department. It had a very strong—well, two very strong men in the department of chemistry who had experience and leanings toward industrial chemistry and engineering, but no formal department. I found myself extremely busy developing a course in unit operations and a laboratory in unit operations for the fourth-year students who were registered in a chemical engineering program. This was made up by giving them selected courses from other faculties, up from other departments. I was too busy to start work on my master's degree, certainly in the first year.

TRAYNHAM: You must have had a rather extraordinary record yourself to be given such responsibility almost fresh out of your baccalaureate program.

GOVIER: Well, I did have a good record, Dr. Traynham. I think, looking back, that the dean put an awful lot of faith in me at that time; but I must say it worked out quite well. I gained the respect of the students, and I worked very hard. Often, the students and I were learning together. I think that even the students of that first class would agree that between us, we did a pretty good job.

TRAYNHAM: How long was it before you undertook your own studies for a master's degree?

GOVIER: Well, let's see. This would have been 1940-1941; I think about 1940. I think the next year, I started. I took advanced chemistry, advanced thermodynamics, advanced mathematics, and started a research project. I can't remember when I got my master's degree—probably in 1945.

I continued teaching. I went back with Standard Oil for one summer because, you know, we had time off during the summer. I worked for an aluminum company—Aluminum Company of Canada—for one summer. I worked for what was then called the Petroleum and Natural Gas Conservation Board, headquartered here in Calgary. I'm sure we'll be talking more about this. I worked one summer for that board in the Turner Valley Oil Field, which is the first big oil field in Alberta, discovered back in the 1930s. Then I guess it was the summer of 1946 that I went to the University of Michigan. I started in Michigan.

TRAYNHAM: What prompted you to choose the University of Michigan for further graduate study?

GOVIER: Two men: George Granger Brown, who was at that time the head of the Department of Chemical Engineering at Michigan, and his protegé and colleague, Donald L. Katz. Both of them had been engaged by the government of Alberta to advise on some technical problems in the Turner Valley Oil Field. With my contact with the Board, I became very much aware of the kind of work they were doing. In essence, what they were doing was applying principles of physical chemistry, thermodynamics, and chemical engineering to the underground oil and gas reservoir. They were recognizing that oil and gas occurred in the porous spaces of rock, in what was essentially a large confined chamber. Therefore, they also recognized that the behavior of the oil and gas mixture—in this large chamber, if you like, mostly filled with rock but having porous spaces in which the fluid hydrocarbons existed—they recognized that that could be treated as a thermodynamic system. Predictions of behavior could be based on that.

This intrigued me. I inquired about Michigan, and I found that it and MIT vied for top position in the United States at that time. I applied at Michigan. I got some financial help. I was granted a sabbatical from the University of Alberta one year ahead of the normal time, which was very good of the university to allow that. I think I got half salary from the university. Then I got some financial help from Michigan. That was the start.

TRAYNHAM: You were at Michigan continuously until you got your doctorate degree, then?

GOVIER: No, I wasn't. Let me see if I can retrace this. I was there, I think, for fifteen months, which was the twelve months of my sabbatical plus a summer. Then I returned to Alberta and took up my teaching position again. By then, we had developed more courses in chemical engineering, and I was teaching two or three courses. Then, I returned to Michigan for a further summer. I spent a total of, I think it was, twenty-four or twenty-five months after my master's degree to qualify for my doctor of science. I graduated from Michigan in 1948, I think it was.

TRAYNHAM: The summary I have lists 1949 as the date. That was when the degree was given.

GOVIER: Yes, that's right.

TRAYNHAM: By that time, you had the rank of professor, I believe.

GOVIER: Yes, I did.

TRAYNHAM: You had a rather unusual record, in moving from lecturer to professor.

GOVIER: Well, not in one jump. [laughter] I was treated very well by the University, however.

TRAYNHAM: You became chair of the department, then. That was the first time there had actually been a department; you were the founding chair of the department.

GOVIER: That's correct.

TRAYNHAM: Now, tell me something about how you developed the department.

GOVIER: Well, of course one of the problems was staff. I was fortunate in attracting a UBC graduate who also went to the University of Michigan, Donald L. Robinson; I attracted him to join the staff. Also, I was fortunate in getting a young man who had graduated from Alberta, and had gone on to MIT and gotten his doctorate there. His name was Donald Quon. Robinson and Quon and I really were the heart of the department. We later engaged a young man by the name of A. Lee Scott.

Then, there was pressure from the industry to have petroleum engineering. Our department at first was chemical engineering. The curriculum was more or less a standard chemical engineering program—no special reference to any industry. There was no reference to petroleum, other than that many of the courses had application in all industries.

The University of Alberta faced pressure to introduce petroleum engineering studies, so we engaged two other staff people who had training in petroleum engineering. We then offered a program in petroleum, along with the program in chemical. The name of the department was changed to Chemical and Petroleum Engineering. The bulk of the courses through the first three years—well, all the courses in the first two years—were common. In the third year, there was some diversity between the chemical and the petroleum program, and in the fourth year, somewhat more.

I remember, our first class of petroleum engineers was something like thirteen or fourteen students. It worked very well. The industry here was developing rapidly. We had our first major oil discovery in 1947: the oil fields called the Leduc Field. That was followed by another major discovery in Redwater, north and east of Edmonton. The industry really exploded from about 1947-1948 onward.

I don't know whether this is the right time to bring it up, but the Petroleum and Natural

Gas Conservation Board (P&NGCB) that I referred to earlier had been chaired by Dr. Edward Boomer, who was the senior professor in physical chemistry at the U of A when I first went there. Boomer became chairman on a part-time basis of the P&NGCB. This was pre-Leduc. This was 1945-1946, in there. The preoccupation of the board was still the Turner Valley Oil Field, where there was a lot of wastage of gas, and where there were problems of correlative rights. I can enlarge on that later if you'd like me to.

Dr. Boomer unfortunately died of a heart attack in 1945. The government was faced with the problem of what to do with the board. The vice chairman was appointed chairman. One of the senior geologists was appointed a board member. That situation continued until February of 1948. At that time, or shortly before, the chairman resigned to go into private business, and the government again was faced with what to do. The government appointed a man by the name of Ian McKinnon, who was deputy minister in the Provincial Government Department of Lands and Mines. I was approached by the government to see whether I would become a part-time member, as Boomer had been. I would be a part-time member, with McKinnon being a part-time chairman. McKinnon and I didn't know one another. We met first in an elevator in your hotel, in the Palliser Hotel. We both lived in Edmonton. We soon developed a great rapport, became good friends, and had a great deal of respect for one another.

We used to take the Sunday night midnight train from Edmonton. We'd get up in the morning from the train, book into the Palliser Hotel, and go over to the board office, which at that time was in an old warehouse building on Eleventh Avenue. You would have driven by it this morning, as a matter of fact—Eleventh Avenue and about Fifth Street or Sixth Street. We stayed and we worked with the staff, which we were actually building up at that time, for two days—sometimes three days. Then we took the midnight train back to Edmonton. It was kind of a strenuous existence for, I don't know, two years—two and a half years. Then Air Canada started a daily air service between the two cities with DC-3 airplanes. Do you remember the DC-3s?

TRAYNHAM: Oh, yes.

GOVIER: We had changed our procedure. We used to get up early Monday morning and catch the first flight to Calgary. We used to have breakfast on the plane. The breakfast was a roll with pink icing on it, and a plastic cup with canned orange juice and some terrible coffee. Anyway, the plane made it a little easier, but we continued on that basis of two to three days a week in each city.

This was the time, too, when, as I mentioned earlier, Leduc had been discovered. Redwater was discovered in 1948, shortly after we became involved with the board. It was obvious that the responsibilities of the board were ballooning and we needed staff. This was where I had a great deal of fun, because here was an opportunity for me to put into effect the same sort of things that I had seen Boomer and Katz do with respect to Turner Valley.

Well, that takes us up to around 1948-1949.

TRAYNHAM: You were continuing as a professor and chair at the University of Alberta, then.

GOVIER: Yes. It was fairly strenuous, but I had a lot of energy and I really enjoyed it. I didn't consider it to be work. I just enjoyed all of it.

TRAYNHAM: You were serving as a member right around the time of the discovery of the new oil fields. What was the primary concern of the board at that time?

GOVIER: Well, the concern was to establish rules for the spacing of wells; to establish safety measures for the drilling of wells; to consider at what rates the wells should be produced for maximum ultimate recovery; and to minimize the dissipation of reservoir energy. There was concern over what should be done with the gas that was inevitably produced along with the oil and its conservation through a process of collecting it, then processing it in the field, and then marketing the processed gas and liquid products. There was concern over correlative rights. Perhaps I should elaborate a little bit on that.

TRAYNHAM: How do you define correlative rights?

GOVIER: Well, it refers to almost the reverse of the law of capture. In the early days—in the United States in particular—the rules of the game were, anybody who drilled a well could produce the well, literally, at any rate he wished. If it drained somebody else's property, so be it. The owners of adjacent property, of course, always had the right to drill their own wells, but sometimes they didn't have the same marketing opportunities. That might mean that if you had greater marketing opportunities than I and we were neighbors, you might produce your well at fifteen hundred barrels a day. I couldn't sell that much oil, so I'd only produce at one hundred barrels a day. Inevitably, you would be draining my oil away.

Well, that was the law of capture. The converse of it, referred to as correlative rights, is the concept that you and I should each have the opportunity to recover the oil beneath our tracts of land. If I don't drill, that's my fault; you can produce, and you will drain my land. But I have the right to drill. The concept of correlative rights, simply, is that each of us would have the opportunity to produce proportionately. You would not be allowed to produce fifteen hundred barrels a day if I could only market fifty barrels a day. In the conservation legislation—here and elsewhere in North America—a very significant element is means for the protection of correlative rights. This usually means rules relating to production: production quotas, production allowable. This became a major concern of the board from about 1948 on.

TRAYNHAM: Was there any particular experience in your background that prepared you for making decisions in this area?

GOVIER: There was only my experience with Donald Katz and George Granger Brown. I didn't work with Brown personally, but I became very much acquainted with his work.

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GOVIER: This was Brown's work related to correlative rights. My only direct experience was in connection with the work Granger Brown did in the Turner Valley Field. I was very much aware of the principles. I was aware of the physical chemistry and the thermodynamic concepts involved. Production quotas were beginning to be set recognizing the fluid under the land in the oil property. This involved, of course, an understanding of the behavior of the oil and gas underground.

TRAYNHAM: At what time in this process did you become dean at the university?

GOVIER: I think it was 1959. Does that check? [laughter]

TRAYNHAM: Yes. You were still involved with the board during that time, then.

GOVIER: Yes, I was. Let me back up a little bit. In the early 1940s, Dean Wilson passed away. He was succeeded by a civil engineer and a close friend of mine whose name was Robert M. Hardy. Hardy had an extensive consulting practice. In, I think it was, 1959, he decided to sever his connection with the university and to continue and expand his consulting business.

At that time, I was invited by the president to become the dean of the faculty. The president, of course, was well aware of my association with the board. I guess I was vice chairman of the board at that time. It was agreed that I would relinquish my post as chairman of the department and take on the deanship, but I would continue to work part time in Calgary for the board. I continued that to February of 1963, when I moved to Calgary and resigned from the deanship. Interestingly enough, Bob Hardy was reappointed dean. At that time, I became a full-time member of the board. I became chairman in 1962.

TRAYNHAM: Do you have any particular recollections of your career as dean? Do you have any particular activities you undertook during that period that you want to relate? Did you have

any building problems?

GOVIER: Yes, there were a few. The faculty was expanding. It was obvious that we needed additional space. I was quite active in pushing for a new building for the faculty of engineering. That was successful; we got additional space. There was a growing demand, and this was—when was this?

TRAYNHAM: This would have been around 1960.

GOVIER: Yes. Right around 1960, there was a growing demand for a university in Calgary. The University of Calgary was established initially as a branch of the University of Alberta. A branch of the faculty of engineering was established in Calgary, as a branch of the Alberta faculty. The first two years of engineering were given in Calgary. This was right around 1961, 1962, 1963. In 1963 when I moved to Calgary, I was appointed professor of engineering (part-time) at the University of Calgary. I was given the broader title because Bob Hardy, whom I had succeeded and who then succeeded me, felt I could be of more use if I was not restricted to chemical and petroleum engineering. I assisted, really, in the administration of the engineering program in Calgary.

I continued my association with the University of Calgary for several years. In a short time, departments were established—the four major departments. A dean was appointed. I became a part-time professor. Well, I was always a part-time professor. I gave a couple of graduate courses for a while. Ninety percent of my time was with the Conservation Board, the name of which was then changed to Oil and Gas Conservation Board instead of the longer Petroleum and Natural Gas.

TRAYNHAM: What did you sense as the appeal for, in effect, diminishing and finally severing your direct ties with the university and moving to the Conservation Board?

GOVIER: It was a difficult decision for me because I enjoyed the academic world very much. I became quite involved in research at the University of Alberta and did a fair amount of research. It was a tough decision. I recognized pretty soon that I couldn't be doing both. I finally said, "Well, I think I'll stay with the industry." I could see it expanding, and I got a great deal of satisfaction out of the application of scientific principles to the regulation of the industry. I think, with due modesty, I can say that our board here sort of led the world in this area because, unlike so many regulatory agencies elsewhere, our board was totally nonpolitical. We were appointees of the cabinet, but certainly not political appointees. We were appointed on the basis of qualifications.

TRAYNHAM: All of the members of the board were engineers or professionally qualified, is that correct?

GOVIER: They were all professionally qualified. McKinnon was a chartered accountant, but he had years of experience in government and in the administration of mineral rights. Mr. D. P. (Red) Goodall was a professional geologist. I was an engineer. Over the years, the members of the board have all been professionally qualified people. None of them have had political ties at all. It was a very favorable environment.

Returning to your question, it was a tough decision. You can see my reluctance to make it because I didn't let go of the university completely; I kept on. Then, I found that I had travel, and I couldn't do justice even to a small class of graduate students. I found I had to miss lectures and reschedule lectures. It wasn't satisfactory.

TRAYNHAM: Well, you became president of the Conservation Board.

GOVIER: Chairman.

TRAYNHAM: Chairman, yes. What did you do in that office to characterize the activities of the board?

GOVIER: Well, I guess I could sum it up this way and say I endeavored to run the organization. The organization had grown. We had several technical departments: an oil department, a gas department, a geological department, a development department, a technical library, a legal department, a big accounting department. In addition to normal financial accounting, which was not a big part of it, we had what we called the production accounting responsibility. In this province, all companies producing oil and gas have to report their production by wells to the board on a monthly basis. Those production records—the maintenance of them—is quite a big job. This was the organization that had to be run, so to speak—but the real job was to handle problems of industry that were brought to the board, or problems that the board recognized within the industry.

For example, the board looked at the Redwater Oil Field. There was gas being produced unavoidably with the oil. The board recognized that for a while, it was uneconomic to gather that gas; flaring of gas was allowed, but we monitored it regularly. As the volume of gas being flared increased, we then called on the operators to show cause why they should not institute a conservation system. We did that by calling a public hearing. The hearing was conducted by the then three board members. Ian McKinnon was chairman, Red Goodall and I were members.

This is indicative of the kind of thing we dealt with. We would hear all the evidence,

and then we would make a ruling. In the case of Redwater, we made a ruling against industry's wishes: that they were no longer authorized to flare gas. They had two choices: they could shut in their wells, or they could conserve the gas. Well, obviously they conserved the gas. We gave them eight months or whatever it was to install the facilities.

Another illustration might be in an oil field where our understanding of the reservoir situation indicated that it would only result in a 15 percent recovery if it was operated the way it was. There was a probability that that recovery could be increased to 50 percent if a water flood were introduced. We would have a public hearing to receive industry's views on the future way of producing the field. In some cases the industry would come forward and say, "We agree the field can be water flooded." We would then approve the water flooding, subject to certain conditions. Well, I won't go into the conditions.

We had countless problems relating to drilling, spacing, correlative rights, enhanced recovery, conservation of gas, and all of those things. They were constantly before us. We would have public hearings maybe three or four days a week. Many of the problems became routine. Then, we devised a system where the hearings would be held by examiners appointed from the staff. The board members would not get involved until the examiners submitted a report to the board. Some matters became so routine that they would be handled at the departmental level. This was the broad nature of the work.

TRAYNHAM: You've emphasized the fact that the board members were appointed by the cabinet. These were not political appointments, however.

GOVIER: Correct.

TRAYNHAM: You were part of a government agency, then. What did you view your principal responsibility as being? Was it to help the industry to see what was best for its future? Were you a protector of the resources for the people of Canada? Or did you find that these amounted to the same thing?

GOVIER: That's a very astute question. We took our role to be to do the best we could within practical reason, and within reasonable economics, for the people of the Province of Alberta. That was our mandate. I might say that while we were appointed by the cabinet, the board ran its own show. We were funded 50 percent by a tax that we levied on industry, and 50 percent by a grant from the government. It was interesting that the way the legislation is written, the board determined its requirements. Say its requirements were four million dollars for a certain year. They're much more now, I might say. We then levied a tax to raise two million dollars. In effect, we submitted a bill to the government for the other two million. That's the way it worked.

We were not the agents of the industry, but we tried to do things in a way that was reasonable and that was economic. I think we maintained the respect of industry. Industry knew that our job was to do what we thought was best for the people of Alberta, but it respected the fact that we didn't ask industry to do things that were totally unreasonable.

TRAYNHAM: In a sense, continued flourishing of the industry was in the interest of the people of Alberta.

GOVIER: Exactly.

TRAYNHAM: You continued in that role until 1978, I believe.

GOVIER: Right. I remember that date.

TRAYNHAM: Is there anything more about the board activities in which you were involved that needs to be recorded here?

GOVIER: Yes. There is one other thing that I think is interesting. The board was originally created in 1938. The raison d'etre was the Turner Valley Oil Field. It was a very small organization. After 1947 and 1948, with the explosion of the industry, the board grew to be quite a large organization.

I've forgotten the dates, but the coal industry had flourished in the early years. With the explosion of the oil industry, the coal industry became less dominant and less of a factor in the province. The coal industry was not regulated to any extent. What government involvement there was, was administered through the Department of Lands and Mines. The government—this would have been in the early 1960s, I guess—decided that it might make more sense to have a technical organization between the government and the industry. To make a long story short, the board was given responsibility for such regulation as was needed for the coal industry.

At about the same time, there was quite an expansion in the hydroelectric industry. There had been an organization called the Alberta Power Commission that advised the government concerning hydroelectric matters. The government again decided that it would be better, on the retirement of the chairman of that commission, if that were handled in a more formal way.

There were two additional responsibilities put on the then-Oil and Gas Conservation Board. One was the operation of the coal industry, and the other one was the hydroelectric industry. I remember I had a lot of fun with our legal counsel developing the legislation for the

hydro and electric side of it, because there had been literally no legislation. Of course there was public concern about the routing of power lines and the construction of dams, and so on—public and environmental concern.

Then there was one other change. The regulation of pipelines had been handled through the Department of Lands and Mines. It seemed more logical to the government that that also would be handled by the board, because it tied in so closely with the board's regulation of the producing facilities in any case. With these added responsibilities, we changed the name of the board to Energy Resources Conservation Board. It remained under that name to very recently, within—well, I guess barely two years ago. The Public Utilities Board was joined with the Energy Resources Conservation Board to establish what is now known as the Alberta Energy and Utilities Board. That's about all I'd want to add in connection with the board.

TRAYNHAM: All right. In 1978, you discontinued your direct association with the Conservation Board. What did you do then?

GOVIER: Well, I had been thirty years with the board. I'd started in 1948—although I was only part time for a while, I had been thirty years in total. I decided I would take early retirement. What would I have been in 1978? I would have been sixty-one. I decided to take early retirement and do some consulting—have a little more flexibility. I can remember very clearly, after I made that decision and announced it to the premier of the province, and to my colleagues, I started wondering how I was going to set myself up.

I got a phone call from the then-senior man of the Royal Bank of Canada here in Calgary—Blake Ashforth. He said that he had heard that I was taking early retirement and was going to be doing some consulting, and he would like to talk to me. We had lunch. He said, "George, we would like to have someone like you to advise us generally on oil and gas matters, because we have a lot of business and a lot of relations with the oil and gas industry. We don't have much in the way of informed people in our shop." He said, "We'd be happy to supply you with an office and a secretary. We'd ask for you to commit not more than two days a week to us. You have the rest of your time." He said, "We'll give you a little pay also."

Well, it was great because I inherited an office, a very fine secretary, an electric typewriter—all the gear I needed. That worked very well. That was in 1978. I continued that for ten years. During that time, I worked with the bank, of course; but I had maybe a couple of dozen other clients with various durations and in various parts of the world. Then in 1988, I decided that before the bank fired me I'd better resign. I resigned from the bank and moved my office right here in my home. I've continued consulting, but on a lower level. I try to work no more than about a quarter of the time.

TRAYNHAM: Is most of your consulting work in the area of petroleum, or do you continue to be involved in a variety of energy sources?

GOVIER: No, it's mostly in petroleum. I recall one substantial assignment relating to pipelines and one assignment relating to the hydroelectric industry, but it's mostly petroleum. It's less and less technical, and more and more government-industry relations—management problems relating to the industry.

TRAYNHAM: What do you think lead to this particular development of interest for you? You started off as a trainee in the petroleum industry. Then you were in academia. Now you are consulting for a variety of clients on management and public policy matters. Do you see any particular watershed at which your interest in this public policy area developed, or was that a result of the years of association with the Conservation Board?

GOVIER: The latter. Now, I say that my work is mostly nontechnical. There have been a number of exciting exceptions to that. One of them goes—the relationship goes—way back to the early 1940s when I was interested in the flow in pipelines of non-Newtonian fluids. A few years back, I was called by the Alyeska Pipeline Company, which is the company that transports the Prudhoe Bay crude oil from the Prudhoe Bay Oil Field to the southern coast of Alaska, where it's then picked up by tanker and taken down the West Coast. That company was aware of some of my early work and publications relating to the flow of crude oil and the anomalous properties and behavior of some oils, particularly at low temperatures (1). Alyeska said that it was planning a series of tests so that it could do some forecasting as to pipeline requirements in the future, when the mix of its crude oils would change, the volumes would alter, and the flow rates would change. Would I advise on these tests? Well, that was a very exciting return to my early days. I got out my early publications and refreshed my mind on these things. I had a very interesting time with the Alyeska Pipeline.

TRAYNHAM: You solved their problems.

GOVIER: I think I helped, yes. I helped them in their understanding of the behavior of the material.

[END OF TAPE, SIDE 2]

TRAYNHAM: You were just describing your consulting career. Is there anything more about it that you would like to record before we go on to another topic?

GOVIER: I don't think so, Dr. Traynham.

TRAYNHAM: Well, your rather estimable career has been recognized by your peers in terms of awards and honors. Can you tell me something about those? No need to be modest.

GOVIER: Well, I think you have a listing of them.

TRAYNHAM: We'd like to get them on the tape. When did you become a member of the National Academy of Engineering in the U.S.?

GOVIER: I don't remember.

TRAYNHAM: All right. You have had activities with your professional societies throughout your career, I presume.

GOVIER: Yes. Do you want me just to run over them quickly?

TRAYNHAM: Sure. That would be fine.

GOVIER: All right. I've been active in the Chemical Institute of Canada, and I was chairman of the Chemical Engineering Division back in 1948-1949. I haven't been active in recent years. I've been a member of the Engineering Institute of Canada, and a Fellow of that institute since 1968. I was a member of the Canadian Institute of Mining and Metallurgy since 1950, and president from 1965 to 1966. I became a member of the American Institute of Chemical Engineers back in 1953.

I might say that I got a tremendous amount of benefit out of that institute. I rarely had the opportunity to attend meetings, but I was an avid reader of all of its publications. In the days when I was active at the University of Alberta in research and in developing curriculum, I found the AIChE publications of inestimable value. Recently, I was sent an award—I don't know, is it here?

TRAYNHAM: The Half Century of Membership Award, is that it?

GOVIER: That's it, yes—with a small diamond in the pin. I wrote the president to thank him for it.

I've been active in the Association of Professional Engineers here in Alberta for many years, and I was president in 1958. I served a stint as a member of the National Research Council. That's the Canadian equivalent of your organization of the same name.

TRAYNHAM: What were your responsibilities in the National Research Council?

GOVIER: I was just a member of the council, reviewing programs and sitting, more or less, on a board of directors. Oh, yes, I became a Foreign Associate of the National Academy in 1979.

TRAYNHAM: That was the National Academy of Engineering in the U.S.

GOVIER: Yes, of Engineering in the U.S. I've been active in the World Petroleum Congress since 1960. I was a member of the Permanent Council; I was a member and a chairman of the major committee called the Scientific Program Committee for a number of years. I'm a founding member of the Canadian Academy of Engineering, which is the counterpart of your National Academy. Those are the principal organizations.

TRAYNHAM: Did you have any particular responsibilities besides being a member of those organizations? In any of them, were you a journal editor or officer of some kind, other than the one office you mentioned?

GOVIER: No, I've never been a journal editor. With the Association of Professional Engineers, I was chairman of the Act and Bylaws Committee for quite a while. That was rather an important role. Then I was chairman of the Committee on Collective Bargaining. I think my most important committee of this sort was the Scientific Program Committee of the World Petroleum Congress. In that, I headed a committee of about a dozen people from all corners of the world. We reviewed technical papers that were offered for submission to the World Petroleum Congress and adjudicated on them. That was quite important.

We haven't talked about directorships. Is that relevant?

TRAYNHAM: Certainly.

GOVIER: Would you like me to discuss these?

TRAYNHAM: Please do.

GOVIER: Well, after I took early retirement from the Conservation Board, I was invited by a number of companies to serve on their boards. One of them was Texaco Canada Inc., what was then the wholly-owned subsidiary of Texaco, Inc. We had a Canadian board. I served on that board from about 1978 until the company was purchased by Imperial Oil Limited, a subsidiary of Exxon.

Let's see, what other? Oh, I served on the boards of Cooperative Energy Development Company, Raylo Chemicals, Foremost Energy Inc. I mentioned Texaco. I also served on the boards of Canadian-Montana Gas, Combustion Engineering of Canada, Stone & Webster of Canada, Bow Valley Resources, and Western Gas Marketing.

The only boards I'm on now are Stone & Webster of Canada, which is a subsidiary of Stone & Webster of Boston. It is a very large engineering construction company. I'm also on the board of Foremost Industries, which is a local company that manufactures all-terrain vehicles and also has a division that offers services to the oil and gas industry. I continue on the board of Montana Power and Montana Gas. I shouldn't say Montana Power—Montana Pipeline and Montana Gas.

TRAYNHAM: After having served on the Conservation Board, in which you were regulating the petroleum industry, you then left to became a member of the board of directors of one or more petroleum industries. Have you ever had any mental gymnastics, I suppose one would say, to adjust to that? Did the point of view have to shift at all?

GOVIER: Yes, it definitely shifted. I'll give you an illustration. On the board, our concern was always the ultimate long-term recovery of oil. Our focus was on insuring that the production rates of wells did not exceed that which would lead to the maximum recovery. On the board of Texaco the attitude was, "We want to produce our wells at the fastest rate, because the time value of money is a very important matter to the corporation." The conservationist has to have some regard for the time value of money, but it's a much less significant factor in his thinking than it is in the corporation. The other thing is—and I found this in every company I was with—the companies have a very great respect for the law and the regulations. They are very, very careful to abide by the rules, the companies I was associated with. Mind you, they'll make a lot of efforts to get the rules changed to suit their needs. I saw that in Texaco: they made efforts to get higher allowables from the board, and the board would resist all this. Usually, there'd be some kind of compromise worked out.

TRAYNHAM: Because of your experience on the board, did you have a feeling that you were, in one sense, an intermediary in your service on the petroleum company boards, to help them understand the Conservation Board's point of view?

GOVIER: Yes. I think that was probably the reason I was invited to join some of these boards, because they felt that my background—on the other side, if you like—would help their understanding.

Another interesting thing I'm involved with currently is, through the government of Canada, we have an organization called Canadian Industrial Development Assistance—CIDA. CIDA has a major project in Pakistan. Part of the project—and this is where the Canadian government is funding work in Pakistan—is to establish a regulatory agency for the oil and gas industry along the pattern of the Alberta board. I'm involved in advising on that and obviously finding it interesting, because so much of my background is right in that area.

TRAYNHAM: Does that carry you to Pakistan to do the advising?

GOVIER: Yes. I've only been there once so far, but this is going to continue over a few years. I anticipate several trips. It's a long trip from here.

TRAYNHAM: It is.

GOVIER: It's also tiring. We go through London. Then, nonstop from London to Islamabad is a tough flight.

TRAYNHAM: Some thirty years ago you wrote an article about engineering, economics, and conservation (2). In this you wrote, "Industry has been most helpful in the cause for conservation in its support of the conservation agencies." You also wrote, "I see continued fine relations between industry and the conservation agencies, and even better conservation ahead." Has your viewpoint of that thirty years ago been sustained, or has it changed?

GOVIER: It's definitely been sustained. I think there's been tremendous progress in the past thirty years. I don't know whether there is room for as much progress in the future. I don't mean with respect to relations, but I mean with respect to gains in recovery and improvements in conservation.

You know, we didn't talk about the environment. Even in the early days with the board, environmental protection was something that we just naturally assumed was part of our job. It wasn't spelled out anywhere, and we didn't have a department of environment. It was part and parcel of whatever we did in the oil fields. Over the years that has become much more in the public eye. It is now a much more substantial part of the activity. Many of the public hearings

relate as much to environment and the public reaction as they do to some of the earlier technical features that we might have dealt with.

TRAYNHAM: In one sense, then, the concerns of the board—especially in the early days—were a bit ahead of the fashion and the public's view at that time.

GOVIER: I think they were. Now, I'm not saying that in the early days we did a complete job, because looking back I can see that we did not. Many advances have been made—but environment was always in the picture.

TRAYNHAM: If I may, let me cite another publication of yours. A couple of decades ago you predicted that the 1990s, where we are now, would be marked by increasing use of gas; an increasing use of synthetic oil, hydro, and nuclear energy sources; and decreasing dependence on crude oil for energy in Canada (3). How on target was your prediction?

GOVIER: Well, it wasn't very good with respect to nuclear energy. Increasing use of gas, definitely. Increasing use of synthetics, definitely. By synthetics, I was then and I am now referring to what we call synthetic crude oil from the Athabasca deposit, tar sands or oil sands. Decreasing relative use of oil, but certainly not decreasing absolute use of oil. I don't know whether in that quotation I said relative use, but I think that might have been implied. Certainly the relative use of gas and synthetics has increased.

TRAYNHAM: What's your view on the duration, so to speak, of our oil resources? There are some who give very pessimistic views for the future. I'm wondering in which direction your career points you to speculate?

GOVIER: Well, I'm not pessimistic. Let's do this in segments. If we think of the conventional oil industry in North America—and by that I mean ordinary crude oil, light, medium, and modestly heavy, but not oil shale or not oil sands or tar sands—we're on the decline. We have what's called a life index—in the U.S., probably, I don't know, eight or nine years; and in Canada, I don't know, ten or twelve years. This simply means that at the current rate of production, the currently known reserves under current technology would last that number of years. That's an index; it isn't a lifetime. Its units may be in years.

I would say that our currently known conventional oil and gas in North America is on a slow decline. If we had nothing else—if we had no imports and we had no oil sands, and oil shales were never going to be in the picture, we're already in trouble. That part's on the decline. The oil sands are an enormous resource, and their production has increased quite a bit in the past few years. I foresee fairly dramatic expansion in the oil sands to take up the slack of the

declining conventional in Canada. We're also seeing increasing offshore production in Canada: the new Hibernia Field, which you're probably familiar with.

When we look worldwide, the resources—even the known resources—are very much larger. The Middle East, of course, you're aware of: it's got enormous resources. What the pessimists don't seem to accept is that we've probably only discovered a fraction of what is here. I think in North America we've discovered a pretty substantial fraction, because there's been a lot of exploration here. Take the Caspian Sea: the modest amount of exploration there has revealed an enormous potential. In Siberia, enormous. There's much more in the Middle East. Dr. Traynham, in answer to your question, I'm not at all pessimistic. North America's going to be increasingly dependent on imports, but there's going to be lots of oil for many, many years.

TRAYNHAM: Each year, the editor of the book review of *The New York Times*—it comes out on Sundays—closes out the year with a list of books that the editor considers to be the most significant books published in the past year. The 1996 year-end book review (4) included, among the hundred books listed, one entitled, *The End of Science* (5). The capsule summary indicated that the author thought that all the great discoveries have been made. From now on, scientific discovery would entail simply tinkering with details.

GOVIER: Was this with tongue in cheek?

TRAYNHAM: Apparently not. Apparently, this was a very serious point of view. The editor of the book review section considered it to be a very noteworthy publication. I would like to have your reaction to that point of view.

GOVIER: I think it's sheer nonsense. [laughter]

TRAYNHAM: Apparently, most scientists do. [laughter] I have asked that question to others, and I get that same point of view. Certainly, your continuing activity indicates that you still find excitement in the area.

GOVIER: Oh, most definitely.

TRAYNHAM: Is there anything that you think we need to add to the record to have a more or less complete record, as you would like to have it, of your career?

GOVIER: There's one other thing I'd like to mention. While I was at the board, I worked often in the early mornings and often in the late nights, and often with my friend Khalid Aziz. Together we wrote a textbook called *The Flow of Complex Mixtures in Pipes* (6). This didn't turn out to be a bestseller. [laughter] It was published by Van Nostrand-Reinhold. One of the things that pleased my friend and me more than the royalties we received, which were minimal, was the fact that it was recognized by McGraw-Hill, the competing publisher, as one of the technical books of the month. In this book, among other things, I was able to include a great deal of the results of the early research I did at the University of Alberta. I was very happy to have that opportunity.

I had a good working relationship with my friend Aziz. Incidentally, he's a Pakistani who went to the University of Michigan, got a master's degree. He came to the University of Alberta, worked under me, and got a master's degree in petroleum engineering. He went back to Pakistan. He became chief engineer for SUI GAS. He wrote to me and said he thought he'd return to North America and take a Ph.D.. Where should he go? I said, "I think you'd better go to Rice," and he went to Rice. He got awards as their outstanding graduate student. He did exceptionally well. He later came back on the faculty of the University of Calgary, and he was stolen away from Calgary by Stanford, where he is now a senior professor and a world authority on mathematical simulation of petroleum reservoirs. He's arriving here on Sunday, and we're going skiing together on Monday. [laughter]

That won't be in the final transcript, will it?

TRAYNHAM: Yes, that will. [laughter] Tell me something about your family.

GOVIER: Well, I'm very proud of my family. First of all, my wife is a very talented woman. She is a graduate from the University of British Columbia and also the University of Alberta.

TRAYNHAM: What is her name?

GOVIER: Doris Eda Govier. Her maiden name was Kemp. Her interest has always been literature. Her graduate work was in the field of English literature; but she very early became enthused with Canadian literature, and disappointed that it was not receiving the recognition which she thought it should receive. She became, not exactly a promoter, but an advocate of the merits of Canadian literature. Initially through the university here, and later on her own, she developed courses on Canadian literature. To this day, she is involved in guiding interested women, in particular, into the field of Canadian literature. My wife and I share a great interest in ballroom dancing, and we do quite a bit of that.

I have three daughters. The youngest lives in Calgary. She is unmarried. She's a schoolteacher, enjoys it very much. She specializes in the younger grades, and she's very, very

good with small children. We see her frequently, of course. The youngest daughter is Susan Elizabeth Govier. The middle daughter is Katherine Mary Govier. She's married with two children, lives in Toronto. She has made a real name for herself in Canadian literature. She is a journalist and writer of fiction, and has been very successful in a very difficult field. My oldest daughter—her name is Trudy Rose Govier—she has a Ph.D. in philosophy, was a professor at Trent University in Ontario—associate professor, I guess. She has been on the faculty of the University of Calgary. With two children, she is busy but extremely active as a writer of philosophical works. She's the author of a treatise on informal logic that is used in a great many universities in the U.S. and worldwide (7). In fact, just this past couple of months she was invited to South Africa to give a series of lectures, based on the fact that they are using her text.

[END OF TAPE, SIDE 3]

TRAYNHAM: It sounds as though your daughters have picked up on your work ethic, too.

GOVIER: Well, maybe more my wife's. My wife has a wonderful work ethic, but we both enjoy doing things, and work.

TRAYNHAM: Obviously. Is there anything more that we should include to make the story complete?

GOVIER: I don't think so, Dr. Traynham. I think you've been very patient with my rambling.

TRAYNHAM: No rambling. It's been very focused and highly interesting to me, as I'm sure it will be to future scholars who will examine the tape and transcript in the Chemical Heritage Foundation.

GOVIER: Well, I hope it will.

[END OF TAPE, SIDE 4]

[END OF INTERVIEW]

NOTES

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2. G. W. Govier, "Engineering, Economics, and Conservation," *Interstate Oil Compact Commission Committee Bulletin*, 6 (1964): 24-32.

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5. John Horgan, *The End of Science: Facing the Limits of Knowledge in the Twilight of the Scientific Age.* (Reading, MA: Helix Books/Addison-Wesley Publishing Company, 1996).

6. G. W. Govier and K. Aziz, *The Flow of Complex Mixtures in Pipes* (New York: Van Nostrand and Reinhold Book Company, 1972).

7. Trudy Govier, *A Practical Study of Argument* (Wadsworth Publishing Company, 1985).

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