PETROLEUM INDUSTRY ORAL HISTORY PROJECT
TRANSCRIPT

INTERVIEWEE: Gilbert Raasch

INTERVIEWER: Nadine Mackenzie

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NM: This is Nadine Mackenzie speaking. I am interviewing Mr. Gilbert Raasch. Mr. Raasch, thank you very much for having accepted to participate in our project. Can you tell me, when and where were you born?
GR: Yes, I was born in Milwaukee, Wisconsin on the 27th of May, 1903.
NM: What did your parents do?
GR: Well, my father or at least he did at that time, at least that's how he's listed on the birth certificate as a joiner. That doesn't imply that he joined many organizations, but evidently it's some type of carpenter. So of course, that was back in the early days.
NM: Were your parents both American?
GR: Yes, they were both born in the United States.
NM: So where were you educated?
GR: I was educated at the University of Wisconsin. First as an undergraduate to get my BA and then subsequently, I went back after the war, with the help of the U.S. government and completed my PhD.
NM: What did you study at the University of Wisconsin?
GR: I studied geology of course and as a minor I had zoology.
NM: Why did you choose geology?
GR: I don't know, I think maybe geology chose me. I got some notes that I found that go back to a time when I was 12 years old and I was writing down a list of the fossils that I found that day. Partly it's a matter of situation. We lived closer to the river and a mile or more up the river were these outcrops of various fossils, this was Devonian rocks. So that I became quite fascinated collecting this material.
NM: So it was an early vocation.
GR: It was an early vocation, yes. It was pre graduating from primary grades you know.
NM: So how many years did you spend at the university?
GR: It was an off and on thing. I completed my undergraduate Bachelor of Arts, by correspondence. I was married by then, the marriage interrupted my education. At least I decided I was more interested in the marriage I guess. So that I completed the course by correspondence. And of course, the university was at Madison, in those days there were no branches. Of course, now it would be very simple to go to the university in Milwaukee. Then as I say, it was after the war that I went back and completed my Doctor of Philosophy degree.

#029 NM: Did you take summer jobs?
GR: As a matter of fact, I was sort of discovered out on these outcrops I was speaking of, by

the curator of geology of the public museum. This is about the time I suppose I was in 7th or 8th grade. So as a result he took an interest in me and I certainly took an interest in him and as a result I became a sort of hanger on at the museum. As I say to people, actually I was brought up in a museum.

NM: You spent a lot of time. . .

GR: I spent a lot of time there. And by the time I was 16 I had a part time job with the museum, so I started my career pretty early.

NM: Yes. And while you were at university, did you have. . .?

GR: Oh yes. Of course, that's where it got started. Well, it just continued while I was at the university. On weekends in the spring and fall I would go out collecting specimens for the museum, for the same Milwaukee Public Museum. As a result of which I ran into some pretty sensational things and some very unusual organisms. As a matter of fact, it led to my publication eventually, of a rather substantial publication by the Geological Society of America. It's Special Paper #19 and these organisms were called by me then, Merestanata??? and they were a whole new group of organisms that hadn't, well, practically hadn't been seen before. So it was quite an addition to the animal kingdom. Which is one of the results of this work that I did in connection with the museum and of course, summers I worked at the museum or out in the field with the museum field parties.

NM: Which year did you have that published?

GR: That was finally published in 1939. But I really ran across these things in the mid 20's. So eventually I published this volume.

NM: So in 1946 you got your PhD from the University of Wisconsin.

GR: Right.

NM: And then what did you do after that?

GR: I went to the Illinois State Geological Survey, as the head of their educational extension department, as they called, which we would call today, I think, public relations. One of our objectives was to encourage or try to encourage the educational authorities to teach geology in high schools. And of course, as a result we'd lead these field trips for high school science teachers. But then of course, there were all sorts of other spin off things, with what today as I say, would be called public relations.

NM: So this is what you did just after your PhD?

GR: Yes.

NM: And in '36 until '41, you worked for Petroleum Geology Oklahoma ???

GR: Yes, I did excavation work for a couple of the companies down there and eventually, I went into, I suppose you might call it exploration and promotional work with a couple of other fellows in Oklahoma. That led eventually to my discovery of an oilfield down in Noble County, Oklahoma. Of course, no one would listen to me and eventually somebody else hit it by accident but I had it outlined. So that made me feel rather good.

#071 NM: And you worked also for Magnolia Petroleum?

GR; Yes.

NM; And Darby?

GR: Darby Petroleum. And then I worked independently with these other 2 chaps, trying to get some wells drilled and to find some oil. Which we didn't succeed in doing but eventually, they drilled in the proper place, in the structure I had outlined and so the field did come in.

NM: So you were right again.

GR: I was right. I wasn't rich but I was right.

NM: In '39 until 1940 you outlined Antelope Field.

GR: Yes, that's the one I'm talking about, it was the Antelope field in Noble County, Oklahoma, yes.

NM: And what did you do during the war?

GR: During the war I was in, it was then the United States Army Air Corps and of course, it was a branch of the U.S. Army and I was in intelligence work in Italy. Then later on, I went overseas a second time and I was in the same capacity with SHAEF???, I forget now what the initials mean but anyway, it was the headquarters of the U.S. Air Force in France and Germany.

NM: So how long did you stay in Europe?

GR: Let's see, the European part of it was probably in the neighbourhood of 2 ½ years. I had an interlude where I went back to the States for awhile, then went out again. As a result I was awarded a, what is it called, this is embarrassing I can't think of the ribbon that I got at the moment but anyway. I felt that too, was an acknowledgement. . .I'll think of it a little bit later I'm sure and let you know.

NM: What did you do exactly in Europe during the war?

GR: My specialty or the specialty that they placed me in was intelligence on enemy transportation, which included in the beginning, all types of transportation, shipping, railroads, roads, and so forth, not air. Eventually I got specialized on to the railroads and it was a case of developing techniques for cutting the rail lines leading to the front you see. It got quite a bit of publicity but of course, as is proper in the military, under those circumstances it was anonymous, so that my name wasn't attached to it. But that's what I got my medal for in any case.

NM: It was a very important position.

GR: It was important. It's routine now to cut the rail lines but at the time it was rather revolutionary you know. They wanted to destroy these. . .they'd like these large, flat targets like ??? yards and railroad centres but this was more a matter of, well, the press got to calling it Operation Strangle. You cut their life line and you isolate the battle fronts you see. And of course, they did that, or tried to do that at least, in Vietnam but I don't think they were quite so successful.

NM: So after the war you went back to university to finish your. . .

GR: To finish my doctor's degree, yes.

NM: And then in '46, while with the State Geological Survey, carried on stratigraphic, palaeontologic and sedimentologic studies in Cambrian, ???, ??? and Mississippian strata.

GR: Yes. Now I gave the more official side of my job a bit, back when I said I was head of the department of extension. But they allowed me time and it so developed that there was

time for me to carry on a lot of my geological work that, ??? continue, pick it up where I'd left off before the war.

#121 NM: And with Carl Bass??? and Associates, co-description in connection with ??? for underground storage of oil and gas in Michigan and Illinois basin.

GR: Yes, that was a little moonlighting job I had through this old college friend of mine who opened this consulting firm down there. Of course, some of the things that I put down there I put down for emphasis because they were relevant to my, well, establishing myself in the job. So it's sometimes, I suppose, really relatively minor things which I thought was important for prospective employers to know about.

NM: When did you come to Canada?

GR: I came to Canada in 1953.

NM: And why?

GR: Well, I became discontented at the Illinois Survey and I needn't go into that, those are old bygones. Besides as I said in the letter of resignation I wanted to work where I could get more into the basic scientific part of the science rather than the public relations thing, which is well, in any case. . . So as it turned out a former member of the staff of the Illinois Geological Survey was up here as head of a company called Canadian Stratigraphic Service. They're still in existence and very important to the industry. What they did was they would prepare well logs, that is descriptions of well cuttings and plot them up and supply them to the industry on a subscription basis. But they also wanted a palaeontologist so I came up here as a palaeontologist with Canadian Stratigraphic Service.

NM: Did you find a lot of difference between working in the States and working in Canada?

GR: Yes. I liked it much better here because it was so cosmopolitan. There you tend to get, because it's such a large country and in a sense, oddly enough, at least in those days, I can't speak for it today, rather isolated and ingrowing. Whereas up here you had geologists from all over the world meeting together, working together, in the same. . .

NM: A lot more international.

GR: Yes, and I liked that very much because there was a much freer flow of ideas and much more tolerance of one's ideas than I found down in the U.S.

NM: So which company did you work for when you came to Canada?

GR: After Canadian Stratigraphic Service as I mentioned, I worked for them for 2 ½ years, I went with Shell Oil Company. The irony of it, this was 1956 and here we are in 1984, they couldn't take me on as an employee because I was too old and . . .

NM: How come?

GR: This was a matter really, of their benefit program and it was the insurance company, they wouldn't accept anyone over 50. So I was taken on as a consultant instead but it worked out very well. And Pete Oberr???, the man I mentioned to you earlier, was my direct superior there.

#161 NM: Can I ask you, what was exactly your work as a palaeontologist for the Canadian Stratigraphic Service?

GR: At that time, the oil companies were very active in field mapping. The Canadian Survey did a splendid job but Canada is a very large country, so that a lot of the oil companies were interested in certain areas where there hadn't been much previous geology done. The field men of course, to identify the formations and to get the proper age of the formations had to rely on fossils for dating. Of course, that was my job then, to identify the fossils and date the deposits. And I also received material from the United States, I mean Canadian Stratigraphic Service is a branch of an American company, and there were these one celled organisms called fusalinids??? and I went into quite a bit of work with the fusalinids from the American west. So that was a rather special branch of my effort at that time.

NM: Did you travel a bit or did you stay mostly in Calgary?

GR: I resided in Calgary. Of course, I liked to get out in the field as much as possible but there wasn't, really, no real opportunities for field work with Canadian Stratigraphic Service and Shell at that time had a policy of not sending palaeontologists into the field, which of course, I regarded as a very wrong policy but. . .

NM: Yes, did they have any reasons for that?

GR: Of course, large oil companies tend to be compartmentalized and their conception of a palaeontologist was one who knew nothing but fossils and sat in the office and they brought these things in to him and he told them what they were.

NM: And after 3 years with Canadian Stratigraphic Service, you left them.

GR: Yes, well, I was approached by a couple of the major oil companies and finally decided to go with Shell Oil. While with Shell, well, I guess I told you previously how I was much too old to become a staff member so I had to go as a consultant and that was 30 years ago. Shell was very active in field exploration in the Canadian west and northwest. Of course, my job, along with several others, the others were younger men and they were glad to have me there as a more senior man, our job of course, was to identify the fossils that they brought us from the field. In order to give an accurate detailed age to these things, we had to work up first of all, a time scale because the science at that time was not that far along and the ages that you gave and that they would have to give on the basis of what was published would be pretty general. So in order to be more precise, we also worked on setting up a detailed time scale, something I'm still interested in, still trying to complete at this time.

#212 NM: And how long did you stay with Shell for, you started working for them in '56, until '67?

GR: Yes.

NM: And what did you do during all this time?

GR: That's more or less what I've been telling you just a bit back. Of course, we identified fossils of all ages as they came to us and it was certainly a very broad education in the palaeontology and as I say, bio-stratigraphy, which is really the use of fossils to date the strata from this part of the world, which was little known in the beginning, back 30 or 25 years ago.

NM: So you set up a bio-stratigraphic zonation for all Paleozoic systems?

GR: Yes. I said that there, yes. As a matter of fact, we had to do a bit more, we had to do the Mesozoic??? and even some of the tertiary in those days. So we just had to tackle anything they sent to us, which is quite a challenge, but very interesting.

NM: You left Shell in '67 and then what did you do?

GR: Then I set up a private consulting operation and continued more or less the same type of work that I had been doing for Shell. Of course, by this time, after 14, 15 years, I was pretty well known and as a result, I was reasonably successful, at least successful enough to keep going from then until the disaster hit the oil industry a couple of years ago. My secretary and laboratory assistant from Shell came with me and so between the 2 of us we set up this business. I did the geology and she did everything else.

NM: Who were your clients?

GR: There were numerous companies. With some the request was a small one but others there was a substantial bit of research. And roughly I should think there probably were, oh, 35-40 companies that I worked for, one way or another during this period when we were doing the consulting. One of the very interesting developments that came out of it was, by this time the frontier of exploration had grown from northwestern Canada to the Canadian Arctic, Arctic Islands, and several of the companies sent me large collections. Of course, in addition to identifying the field samples, I would also identify material that came from well cores. So that it gave me a really good basis for doing the geo-chronology or the bio-stratigraphy of that part of the world, which was a real opportunity because that really was an almost virgin field at that time. And of course, I always regretted that no one would actually send me up there which I would dearly have loved but anyway this was the next best thing. And that brings me to my latest publication, which summarizes the information that I was able to gather on the lower and middle Devonian, which I call the lower and middle Devonian fonal??? zones, that is to say, fossil zones, in the Canadian Arctic archipelago. And this was published in 1982. That was an example of the thing that I've always been the most interested in, is trying to date these deposits in different parts of North America.

#278 NM: The list of your clients here is very impressive. Can we talk a bit about each company, what did they ask you to do. For example, Amerada Petroleum, what did you do for them?

GR: Yes, well, some were so minor, I'd have to go back into the files to remember but the more prominent ones certainly can come to mind. For Americo I cooperated with them in piece of research where it was a sort of . . .oh, I can't think of the proper term for it but it's a type of thing that is supported and subscribed to by say, half a dozen oil companies to do a piece of research. And they will guarantee that they will take your report, which allows you to finance the research you see. So this was some work I did. Others involved in that piece of research which I'll mention more specifically in a minute, were Aquitaine. . . running down the list, let's see, Pan Canadian, which used to be Canadian Pacific Oil and Gas, ??? Resources and I think there were 1 or 2 more but they don't come to mind just off hand. But this time I went into the field on my own, did my own field work with the cooperation of these companies of course. And it was a case of tracing some of the

key formations from the central region south of Great Slave Lake, into the section in the Mackenzie Valley. Of course, once you determine the correct and specific age of these deposits and you trace them around you'll find, which is only to be expected, that they, as we say, they change facees. In other words in some places you're dealing with the shore line, some places you're dealing with coral reefs, other places you're dealing with deep basins. And of course, as you go to these different environments the deposits change, so do the fossils to some extent so you've got to take steps to equate these different facees so they can be correlated, put in the same age slot. That's what that was about. That's the kind of thing I like to do anyway. Atlantic Richfield was the first company to send me a great deal of material from the Arctic.

NM: This is the end of the tape.

Tape 1 Side 2

GR: Well, Atlantic Richfield, now they would be Arcan, were the first company to send me a great deal of material from the Arctic. Again, it was, as I recall, I think it was the whole spectrum of what we call the fanozoic???, the period in time in which fossils are found in the strata, all the way from the Cambrian, which is the oldest of course, to the Tertiary. And of course, it was an entirely new region, which was again, a challenge and really very interesting. That was followed by several other companies, Pan Arctic Oil was another and Pacific and Phillips, they're affiliated, Pacific and Phillips Petroleum sent me large collections from the Arctic, which I was very happy to be able to examine. It's the basis really, on which I set up the paper that I just mentioned a big back, with a time scale for part of the Devonian up there. Early on, when we first struck out on our own, I should call her my junior partner rather than my secretary because actually that's how she functioned, that's Mrs. Patricia, Beefus then and now Patricia Alexander, who I owe a real debt for my success as a consultant because she worried about all the things that had to do with other than the purely geological end. Among other things we did some work for the Geological Survey of Canada, that is the western branch, which is of course, the Institute of Sedimentary and Petroleum Geology, where I had many friends and still do. There were various tasks, one of them was to set up a system of field labelling so that the geologist in the field could fill out a . . . well, an identification label as to where the collection came from and the age of the rocks in which it was taken. It was the type of thing that would follow through and fit into the records and be a unified system and so they asked me to study that and set it up and that's what they're using today, which makes you feel rather good. We also collected fossils from a number of their cores, well cores and we for awhile, we conducted what they call bug picking which is. . .

#032 NM: What is it?

GR: That's a term in the industry but what it means really is picking out small and micro-fossils from well cuttings in order to help establish the age. . .

NM: ???

GR: Yes, that's bug picking. Everyone in the industry would know exactly what that meant.

Running over the list, let's see if there are some others that are interesting. We did a survey in cooperation with W. B. Brady, another geologic consultant, in measuring about a score of sections in northeaster British Columbia. These sections, let me think now, yes, they were all in the Devonian of the outcrops in the front ranges of the Rockies, in northeaster British Columbia. That was one time I had a chance to get out and do some field work. I maintain you can't fully evaluate collections of fossils or anything else unless you've seen the rocks they come from in the field. So I was very happy to be able to do that. I'm just trying to see if there's anything more that I can put in here as a highlight. I think those will serve as examples, we needn't have the whole detail. This is the last, what was it 15 years, let's see, '67, I guess 14 wasn't it, '84, if my mathematics are correct. So I think we might knock that off there.

NM: And you are still working?

GR: Yes, I am. I think I'd be rather lost if I did otherwise. Of course, right now the industry is in the doldrums and my paying work doesn't quite pay for my expenses but I regard it also as a retirement activity in part. When I don't have paying work I'm trying to bring all the data that I've gathered over these, let's see, '53, well, 31 years, try to bring this data together and see if I can find outlets to publish some of this material, which otherwise will just be lost. So something similar to this paper that I mentioned a bit back on the fonal zones in the Canadian Arctic.

NM: Mr. Raasch, can we talk about your publications, you have so many of them?

GR: Well yes. Before coming to Canada my oldest publication goes back to 1921, when I was 18 years old. I was at the museum then and they were digging a water tunnel for the water supply of the city and they were digging under Lake Michigan and they got into these shales, which don't crop out on the land at all and they were throwing all this stuff up on the beach. I was an 8th grader then and I would go along and collect his material and eventually it wound up at the Milwaukee Public Museum. The curator, my friend, whose name I certainly should mention, Dr. Ira Edwards, now dead for some considerable number of years, and I published this little paper announcing the discovery of these fossils.

#071 NM: And you were only 18.

GR: And their age, and I was only 18 then. So that was my first paper. But for the most part, while I was in the States really, in let's say, especially Wisconsin earlier on and Illinois, with the Illinois Survey later on, my publications were mainly on the Cambrian of that region. And of course, that's a classic area for Cambrian studies along the upper Mississippi valley and in the hills of the western part of Wisconsin and eastern Minnesota. But I did dabble bit in other than the Cambrian, I did something in the Ordovician??? and something in the Devonian as well. Then, coming to Canada, having spent some time in Illinois, where the Mississippian beds are classically outcropping. In other words, where the Mississippian itself comes from the upper Mississippi Valley, from the middle Mississippi Valley really. Which in Europe is referred to as the lower Carboniferous or sub-Carboniferous, I came up here and there was a great deal of interest

in beds of the same age up here. So I naturally fell into that type of study. With Peter Hawker of the Geological Survey of Canada, we did one of these zonal studies of the Mississippian, these fonal zones and of course, trying to set up a ??? stratigraphic time scale again. So I first had a reputation for being a Mississippian specialist, which actually, I sort of got be default because I had more background than anyone else but I didn't have a great deal. Then while with Shell, it wasn't convenient to publish very much but . . .that was when I was still with Canadian Stratigraphic Service. Then we got into, at the same time, I mean interesting, in connection with the collections that people would send us when I was with Canadian Stratigraphic Service, there would be some interesting points that would be worthy of note and short papers published in the local journal of the then newly founded, Alberta Society of Petroleum Geologists. There's some on the Devonian, some on the Permian as well as the Mississippian. And of course, I did also some. . .I don't know how to express it, well, I see a title here, Stratigraphic Applications of Palaeontology, of course, I was propagandising all the time because I felt that the oil companies could use more applied palaeontology than they were using. And in the interests of really, in 2 ways, one is the actual dating that I've spoken a lot about previously here and the other was what's called paleo-ecology. In other words, your ecologic environment as determined from the fossils as well as from the rocks. And of course, this is important because I mean, one is what they call the source beds, which are often black shales full of hydrocarbons you know. Which to oversimplify, which when they're squeezed, yield up the oil which then migrates into the more porous formations you see. Then also of course, to try to anticipate, this is in the case of course, of the subsurface, through the cores of wells and well records, when perhaps one is approaching a coral reef, which might be of real economic value and [listen to that source]???, you see. Another thing that I did get into when I was with Shell, it's suggested to me by this title, Polar Wandering and Continental Drift. This was a symposium which one of my co-workers in Shell was really sponsoring and I was cooperating. This goes back, I don't want to go too far into the history of the science but there was a time, perhaps in the late 19th century I believe it was, when a certain geologist and his followers came out with the idea that the continents were not always in the position that they're in today but that they'd pulled apart. They put the mosaic back together in a rather crude way and actually, in my early years, in the university and through that period, that idea was absolutely condemned as foolish, then with new evidence, especially through. . .well, through 2 things, through paleo-magnetism, which is the magnetic orientation of the strata, the magnetic field, which remains constant. Of course, this is all plate tectonics, today, everybody knows about it. But it's relatively new and it's really only been accepted for the last couple of decades. So when these magnetic fields are disoriented they indicate that there's been movement. The other things of course, is the ??? themselves. For instance you have certain periods like, in the Paleozoic, the tropical zone, I mean the fossils show the tropical zone extended from Greenland, down through western Canada and across the Pacific to Australia. That was the tropical zone you see. Of course, I think we helped start this off with this symposium, actually it's a feather in the cap to the Society itself for having done this. And of course, now everybody knows it. So it's pretty

generally accepted. Let's see if there's anything else that. . .oh, one thing, one of my activities, let's see now, yes, while I was with Shell was I was ??? to the geology of the Arctic, which was an international Symposium. It's called officially, the 1st International Symposium on the Geology of the Arctic. Of course, one of the exciting things about it is, this was the first time that the Russians ever sent a geological delegation to the west.

#158 NM: That was very historical.

GR: Yes, it was. I'm trying to remember now which year that was. Well, I can easily find it, I'll look it up in a minute. And of course, the press went mad, absolutely mad.

NM: And this symposium was in Calgary?

GR: Yes it was, yes. It was held in Calgary. And then of course, the papers were all assembled in the 2 volumes. I'll just take a minute and find out the date and grab them off the shelf. Well, this international symposium was held in Calgary in 1960.

NM: How long was it, a week or a few days?

GR: I don't recall now but it was, I think it was a few days. But it was very well attended, people came from all over the world, from Norway, from Britain, from Russia of course, which was the feather in our cap, from France. The Chinese didn't cooperate in those days but the Russians came and of course, that was very exciting for the press. They hounded those poor people practically to death.

NM: ??? this symposium?

GR: I was. I was one of the organizers of the symposium and . . .

NM: So did you write to a lot of people abroad to ask them to come?

GR: Yes. I don't recall the details right now but of course, we had to have a big, wide advertising campaign and of course, the professional journals would help to advertise a thing like that. It was a huge success, far beyond our expectations.

NM: And 2 books came out of it?

GR: 2 books came out of it and a set of maps and charts.

NM: And you were the editor for this?

GR: I was the editor, yes. And since then there have been 2 others held. There was one held in the United States, I forget the date off hand but I don't think that's important right now. And then of course there's this one, in which I, actually I published the paper that I mentioned earlier, 1982 but I think the meeting must have been. . . no, I guess the meeting was in '82 also. This was published in December, the meeting was in the summer. This time unfortunately, due to political reasons, it had nothing to do with geology or the personality of the geologists, but the political reasons, the Russians refused to come. And that was very regrettable. That pretty well expresses I think, the highlights. I'll just run over this.

NM: And what other publications do you have?

GR: I have a great many but I think perhaps we've hit enough of the highlights to take care of that. Some substantial and some short notes and so on, you know.

#197 NM: What are your professional affiliations?

GR: I'm a fellow of the Geological Society of America. And up to a year or two ago I was a member of the American Association of Petroleum Geologists. I resigned probably as one of the early steps in the retirement process. Not that it was any difficulty anyway. And of course, I'm a member of what was the local geological society here, which is now the Canadian Society of Petroleum Geologists and was originally called the Alberta Society of Petroleum Geologists and was founded by some of these people that you've interviewed previously. People like Lou Workman and Carl Oss??? and Glen Fox and a number of people back in, that would be, let me see, that would be in the early 50's. I served as editor for the Society in 1958. And I'm also a member of the ??? Palaeological Society they call themselves, this is the British society of palaeontologists. And also of course, the American Society as well. And I have been off and on members of some of the State scientific societies and so on but they sort of come and go as I come and go. We needn't go into that I guess. ??? requested to contribute to the National Advisory Council on Research in the Geological Sciences, which was in 1962, 1963. My statements were published as part of their 13th annual report. I call the contribution the role of research agencies in connection with the petroleum industry really. Or with the energy and mineral industry more broadly. The statement here, which probably will highlight what my thinking was along those lines and which is still my thinking, was published there and if I may quote, Dr. Raasch expressed the view that research agencies render a greater service to industry when they concentrate on fundamental rather than, on applied research. Applied research, and this is a quotation, applied research is a necessary and proper function of industry in general and of mineral exploration in particular, including energy exploration of course. But an extended degree of fundamental research by exploiting companies years under our existing system, basically not feasible as well as uneconomic. Therefore the research institutions, be they private, public or academic, render a greater, in fact an essential service to industry when they concentrate on fundamental rather than on applied science. Industry in meeting its own needs and those of society generally, cannot draw beyond what is currently available in the pool of fundamental science. With this statement as a basis, Mr. Raasch discusses the need for more basic research in the field of palaeontology and also mentioned that similar reasoning could be applied to the various fields of physical geology. I see here, glancing over some of my notes, there are a couple of other areas in Canada where I've done a similar type of palaeontologic and bio-stratigraphic work. One is in the northern Hudson's Bay region in the area of South Hampton Island and also in the Quebec lowlands, in the eastern townships, where I also had an opportunity to check some of the field studies and also visit this extremely interesting part of the province of Quebec. While I was with Shell I was requested to do a piece of work which resulted in a very substantial volume, which however, is not available to the public. It was a bio-stratigraphic breakdown and a stratigraphic correlation of the Ordovician of North America, that is north of Mexico. It was a great challenge. I also had an opportunity to both go into the field a bit, in the United States and to interview some of the outstanding people in the studies of the Ordovician. So that was a project that I think I have the right to feel rather proud of, but whether it'll ever be published and see the light of day, I don't really know. Of course, it was done, the science

moves so fast, it was done about 15 or more years ago, so it would have to, to go into press today it would have to be substantially updated anyway. It's just one of the things, one of the interesting jobs that it's been my privilege to have in the course of my career.

NM: This is the end of the first interview with Mr. Gilbert Raasch.

Tape 2 Side 1

NM: This is Nadine Mackenzie speaking. This is the second interview with Mr. Gilbert Raasch. Mr. Raasch, could you comment on the use of bio-stratigraphy in exploration for oil and gas?

GR: Yes. I think the best way perhaps, to explain and clarify the thrust of bio-stratigraphy, would be to quote from an article of mine that was published in Oilweek, the issue of March 31st, 1962. The headlines aren't mine, the major head is Bio-Stratigraphy and Oil Finding and then a sub heading, Accurate dating of rock units becomes difficult and confused as explorationists move away from much studied areas but the criterion of applied palaeontology can overcome handicaps in regional knowledge. Then they nicely gave me a byline and I'll quote from the article, not necessarily the entire article of course. I'm quoting, as Canadian oil and gas exploration continues to expand farther and farther beyond the Alberta and Williston basins, the recognizable litho-stratigraphic signposts are left behind. Whether this expansion is in the direction of the structurally complex, cordillera??? or into the vast expanse of the Territories and the Arctic Islands, accurate dating of the rock units becomes increasingly difficult and confused. The standard methods of direct tracing through detailed litho-stratigraphy, electric log interpretation, or seismic techniques must await years if not decades of exploratory drilling supplemented by surface mapping before these standard procedures can be developed to a working level over areas so immense and so remote. There is however, one technique for correlation and subdivision which can overcome the handicap of gaps in the regional knowledge, amounting to hundreds, even thousands of miles. This is the criterion of applied palaeontology or more properly, bio-stratigraphy. Bio-stratigraphy works in 2 planes, the horizontal plane corresponds a long range correlation and furnishes horizontal components for a frame of reference. The vertical plane involves detail subdivision of the stratigraphic succession. As a restraunteur says, the finer you can cut it, the greater the profit. In those areas most favourable for oil accumulation an accomplished bio-stratigrapher can gradually subdivide the stratigraphic section into 1-2 hundred foot units separated by horizontal surfaces, which furnish valuable datum horizons. Only through reconstructing the geography of the time can the location of such potentially productive features as reef trends, carbonate bank interfaces, ??? erosional escarpments, marginal pinch-outs or porous zones and the precise timing of tectonic disturbances be reliably predicted. What the old geologist must do in short, is reconstruct the geography of ancient seas and their bordering lands. But to do this effectively you must choose the right slice of time, and above all be sure he is not trying to combine 2 or 3 slices of time, which would be about as successful as attempting to complete one jigsaw puzzle by using parts of 2 or 3 different puzzles. Finally, in the foregoing situations, it is

to be noted that the palaeontological criteria were used in conjunction with a variety of physical criteria. In other words, bio-stratigraphy does not replace other methods of geological interpretation but augments them. And often is supplies the missing piece which completes the solution.

#045 NM: Mr. Raasch, during the first interview we talked about the First International Symposium of Geology of the Arctic. Can you comment a bit on that?

GR: I think I was looking at it more from a sample of my personal involvement but I think perhaps a bit more should be said to clarify how this came about and why it came about. This can best be done by my quoting from the preface and from the foreword that appears at the beginning of the first volume of this historic publication, I guess we can call it. Quoting the forward as to how this came about in other words; At the meeting of the First International Symposium on Arctic Geology held in Calgary, Canada, January 11-13, 1960, a number of instructive, interesting and original papers were presented and essentially all of them are printed in the pages of The Geology of the Arctic, Volumes I and II. The idea of calling such a meeting was conceived by several members of the Alberta Society of Petroleum Geologists in the year 1958. The task of organization began during the following year, with appointments of the various committee chairmen. Thanks to representative bodies, organizations and individuals of Great Britain, Denmark, the USA., the USSR and Canada, encouragement and moral support from the outset indicated the ultimate success of the meeting. The financial grants received from the government of the province of Alberta and the government of Canada were also a large factor in ensuring the ultimate success of the symposium. And to the authors of the papers presented at this symposium, a debt of gratitude is due, to say nothing of the members of the various committees listed herewith, who gave of their time and effort in an outstanding and unselfish manner and to whom again, we extend our sincere thanks, namely: George S. Hume, PhD, OBE, Honorary Chairman of Organizing Committee, John A. Downing, BSc., Executive Chairman of Organizing Committee, Derrick W. R. Wilson, PhD, General Secretary of Organizing Committee and Chairman of Publicity Committee, A. W. Burn, PhD, Chairman of Technical Program Committee, John N. Townley III, BA, Chairman of Registration Committee, Gordon Hamilton, BSc, Chairman of Exhibits Committee, Frank Buckle, Chairman of Transportation Committee, E. W. Cogger, Chairman, Circum-Polar Map Committee, A. J. Goodman, PhD, Chairman of Technical Services Committee, J. Corbeny, BSc, Chairman of Accommodation Committee and Gilbert O. Raasch, PhD, Editor. It is hoped that publication in these volumes will meet with the same measure of success as did the meeting of the symposium, which, in calibre of papers presented and attendance, far exceeded our fondest hopes. That is signed, Theodore A. Link, PhD, Chairman of the Organizing Committee. I think it's only appropriate these men that made this contribution are mentioned

#085 NM: Absolutely yes.

GR: . . . in this thing that we're doing. Now as to the why, I think that is perhaps well

expressed in the preface, which follows the forward and which was written by myself as editor. So I'll quote that. The genesis of the idea that culminated in these large volumes is worthy of particular note in this introduction for it was an idea that rose spontaneously from a common need among men working in a field of applied science. Many international congresses come into being, mainly through the efforts of members of distinguished universities and renowned institutions of research. The instigators of the present symposia were not so connected. Neither were they, by and large, top executives in the oil companies with which they were affiliated. Rather they were plain citizen scientists in an average metropolis of a typical prairie province of Canada. That province however, happened to be an especially stimulating place to work in this mid-century. From it, in terms of geological and geophysical research, the horizon each year could be seen to be moving northward. And then, there was no more north, there were only the circum-polar regions, Alaska and Greenland, Scandinavia, Russia and Siberia. This same movement of interest and activity north, was of course, taking place also in Europe and in Asia. The jigsaw puzzle of the earth's northern crust could only be completed, it was felt, if the players in each region could see what pieces the others had assembled. This even if they did not express it in so many words, the oil geologists of Calgary understood when they decided early in 1959 to call the 1st International Symposium on Arctic Geology, under the auspices of their Alberta Society of Petroleum Geologists. It was a daring venture. The response to their invitation might quite simply be described as a triumph of a community's initiative. There were representatives from the United States, the United Kingdom, the Scandinavian countries, and from the USSR. What had been envisaged as little more than a handful of men around a table grew and grew. Scientists from the universities, the research institutions and the field came in such numbers that the registration exceeded 1,100. Such a wide participation has enabled the sponsors of these volumes to offer in them a truly inclusive picture of the state of knowledge of Arctic geology and they are happy to present them as a tangible witness to the stimulus of the meeting itself. The editor was a captain of a large team of colleagues from many specialties in the geological sciences, who patiently and generously read papers in preparation for publication. To all of them, and in particular, to his editorial assistant, Mrs. Patricia Ann Beefus, must go a large share of credit for the appearance in print of these major volumes. Signed by my initials. I think another measure of the success of this is the fact that we have now experienced a 3rd symposium, once again in Calgary which I mentioned earlier on in the interview.

#123 NM: Can you compare the training of oil people in your time to what it is nowadays? You have seen all these changes.

GR: I've seen the changes, I'm not too up on actually, the academic programs that are related to the oil industry in the more recent period. But I have a few thoughts on the subject. Early on, as I went into the petroleum industry, as a geologist, I was impressed with the fact that far more than 90% of what we had learned and experienced in our university course, be it a bachelor of science or a PhD, was really irrelevant to the work that we were assigned. I felt rather distressed at this, I often felt that many of the jobs, not all of

course, we need leadership, we need a deep and thorough knowledge of the science of geology within the oil companies, but not by each and every geologist and that is actually the way it developed. I often felt that many times the geologist was given a hack job. Not only was it a hack job but it was a hack job that probably could have been carried on by an intelligent high school graduate. One of the developments I think, of which the province may be proud is, and it is a thrust along these same lines, is the setting up of a course in petroleum technology, which combines geology and engineering as applied to the needs of the oil industry. This is a one year course, I thought it was pretty intensive, I admired the student were able to complete it. The reason I got involved with it was the simple fact that I lived across the lane from the Chancellor and so we talked about it over the fence. Next thing I knew I found myself on the organizing committee. But it's something that I really had strong feelings about because I had a feeling there was a tremendous waste there in many cases, a waste of money and especially a waste of time and waste of educational effort because on the average, only on the average mind you, there is as I said before a need of leadership with a full training in the science. But I felt there was an enormous waste in the. . . well, in hiring these thoroughly academically trained people and then putting them at what I would consider, essentially, hack jobs. I think this course at SAIT, the Southern Institute of. . .well, anyway, SAIT, the course at SAIT goes a long way toward. . . well, answering this need and also making unnecessary the use of trained scientists for rather routine jobs let's say, in the industry. Now to what extent training, and hiring policies of course, which are relevant, have changed today, I really can't say because I've been pretty far out of touch, so I think I'll just have to leave that at about this point.

NM: Can you comment on the ups and downs of the oil business?

GR: Well, I'm certainly not an authority on the subject. On the other hand I've been associated with it for a long time. I think on the one hand, it can to a degree let's say, be correlated to the ups and downs of our economy in the western world. But it has been a history of scarcity and glut. Or at least of apparent scarcity or the fear of scarcity and glut and I think that's pretty obvious in what's happened in the last 5 years. You only have to go back, well, less than that to realize, there was almost panic over the shortage of oil to meet our needs and of course, which resulted in all sorts of spin-offs, like OPEC and attempts by various societies to convert from oil to other energy sources, people cutting back on their use of petroleum products, natural gas and then suddenly, here we are with another glut. Having had a chance to observe the mineral industry as a whole, over a number of decades, shall we say, I find that this is almost normal. I remember right after World War I it was announced with great panic that there was a world shortage and it would be a permanent shortage of lead. And it wasn't more than 10 years later that suddenly there was a glut of lead on the market. So I think part of this is natural and of course, it certainly should be, any step that can be taken to minimize this unfortunate tendency are worth doing. On the other hand I think it's really part of our system. Of course, unfortunately in this last one, I think there were 2 factors at work. One of course was the OPEC attempt to control the market, which resulted, as these things always do sooner or later, in a glut on the market. And then of course, the unfortunate policies of our

government in Ottawa. I think either one of these would have been capable of busting the oil industry, say in the west and in Alberta and we certainly didn't need 2 of them.

#206 NM: What do you think of the National Energy Program?

GR: I guess what I think of the National Energy Program is already implicit in what I just said. But if I had known that this interview was coming I would have kept notes over the last couple of years and been better prepared to expound on it. In general I can certainly say that and I think, I'm certainly not very strong ??? but your National Energy Program was a disaster, not only to Alberta and the west but to all of Canada economically. I don't think. . .and this is not so apparent and there are so many sources that are competent to expand on this that I don't think I need to say anything further, except that it was a most regrettable development.

NM: You came from the States to live in Alberta. Can you comment on the contribution of Alberta to the development of the Canadian oil industry?

GR: Well, I can say something on the subject. Of course, in a very general way, from the standpoint of Canada's contribution to the oil industry of course, first of all, there was Ontario and the Petrolia field, which came in very, very early. It is argued that the first well was not drilled in Pennsylvania but it was drilled in Ontario.

NM: And nobody can agree on that.

GR: No. Well. . .

NM: The Americans say it was us and the Canadians say it was us.

GR: Yes, well, they defined it differently so in a sense both sides can prove they're right. It's not terribly important but it is important that very early in the history of the use of petroleum products, that Canada made a big contribution in Ontario. And of course, it was a matter of geography, I suppose the people that discovered it deserve some credit but it was there, it was going to be discovered anyway. And I suppose you can say that about the western oil. It isn't quite fair to say Alberta because Alberta has the largest contribution but it's an area which extends from . . .

NM: ???

GR: Yes, and it also extends from a corner of Manitoba into northeastern British Columbia. So it's the prairies really but Alberta of course, having the major share of the productive area. Of course, it was several different phases. I haven't looked it up, it's well published, there were several different phases. One of course, was the discovery of gas very early on at Medicine Hat, which led to the development down there of a little city and of industries connected with the use of the gas, you see. Then of course, Turner Valley had 2 different phases before the present one really. I think one was in World War I and the other was in the 30's. I remember I then was operating as an oil geologist in the state of Kansas. I remember talking with people on the rig and of course, the drillers and those people had friends who had gone up to Canada for this new boom. I suppose this would be in about 1938, and we all sat there, it was winter and it was quite bleak sitting out there on the Kansas plains and we were wondering how anyone could stand to drill in a region so inhospitable as Alberta. So that was my first real consciousness you might say, of Alberta oil and gas development. Anyway, those are just some general running thoughts. I don't have anything authoritative to say on the subject.

#265 NM: What is your opinion on nationalized oil companies?

GR: I could make my opinion very short and very definite. I think it's economically not feasible. I certainly feel that it's the private sector that should carry on this work. Of course, it's not just the multi-nationals, it's the multi-nationals actually is probably an unfortunate term but it's the one that popped into my mind. They feed off the developments of the small entrepreneur. At least that was my experience in the United States. Most of the discoveries were made by small entrepreneurs who didn't then have the capital to develop and so they sold out to the big companies and everybody was happy because they'd made a considerable amount of money just the same and then of course, the larger companies, the multi-nationals or the larger national companies could carry on from there. So actually economically, it made a lot of sense. I think it makes a great deal more sense than for the government to step in. The difficulty with governments operating any of these big things is. . .well, I'll put it another way, the private developer, be he a small entrepreneur or a multi-national has to make a profit. And it's the profit that is the guide as to the efficiency and really, to that extent, to the need of this material and the quantity of the material. And it's up to them to keep the cost down so that they can sell more of their product. A government doesn't have to worry about profit. If the operator has a loss, and this has certainly been well demonstrated in the last couple of years in Canada, if the operator has a loss the public makes it up out of taxes.

NM: This is the end of the second interview with Gilbert Raasch.

Tape 2 Side 2 Blank

Tape 3 Side 1

NM: This is Nadine Mackenzie speaking. This is the third interview with Mr. Gilbert Raasch. Mr. Raasch, last time you forgot the name of the person who was in charge of organizing this course for the petroleum industry at SAIT.

GR: Yes, that's right. And as usual, a couple of minutes after you left it came to me. The man's name and he certainly deserves a great deal of credit and the man who did live across the lane from me is Bill, that is William, Saunders.

NM: This course is very well regarded in the oil industry here in Calgary. People think it's a very good course.

GR: Yes, well, I'm glad to hear that because I was very much for it. Because as I said earlier, I felt that it filled a valuable chink or gap in the education so that for certain types of things that the industry needed, certain types of knowledge in both geology and engineering, they didn't have to hire someone with 4 years or more of college education, most of which would be superfluous.

NM: Absolutely.

GR: So I think Dr. Saunders at that time was the Vice-Chancellor at SAIT, then he moved on up to the university, well, the northern institute at Edmonton. So I've kind of lost track of him now.

NM: But he did a very good job.
GR: He did a fine job, yes.
NM: It is very important for Calgary too.
GR: Yes, it is, he deserves lots of credit.
NM: Looking back at your career, what do you consider your major achievements?
GR: I noted down a few things. It's over quite a span of time so there's a considerable list here, both since and before my coming to Canada. I suppose that I can call them achievements because it is a contribution, which if I hadn't been there, wouldn't have been made and would have been lost. I think I was in the 8th grade when they first began dumping a lot of shale on the beach of Lake Michigan at Milwaukee, and this is because they were building an intake tunnel for the city water supply. The idea being to go out as far as possible to get, hopefully, purer water than you would get close to shore. They dumped this stuff on the beach and I was, well, starting in the 8th grade, in those days primary school ended in 8th grade you know, and then there were 4 years of high school. During those year I very diligently collected any fossil material that would come up with these shales. It turned out to be quit significant because without this huge collection there would be no evidence of late Devonian beds in the state of Wisconsin or perhaps I should say, just offshore of the state of Wisconsin. Especially interesting was a very thin zone ??? in the shale which carried great numbers of cormodonts???, micro-fossils as the industry should know by now. As well as fish bones and some other remains and the cormodonts have since been studied and published by someone, well, I could look up his name but it was someone connected with the University of Wisconsin, Milwaukee branch, University of Milwaukee I guess it's called now. And it was great gratification to me to see that this had gotten into print although there's still other things that haven't yet been published. The material is all now, in the public museum at Milwaukee but it's because I was able to sell this collection, boxes, to the museum for the fabulous price of $100, which was. . .

#045 NM: That was a lot in those days.

GR: That was a windfall because that paid for about the first 2 months of my university education. So I not only made a contribution but I did derive some material benefit from it. When I was at the university the museum very generously and very fortunately, at least as far as I'm concerned, would pay me to go out on collecting expeditions on weekends. I think I mentioned that earlier on but I'm building up to something in particular. Of course, it was all in a sense, unexplored territory and the only transportation I had were the trains, which in those days of course, fortunately stopped at every little whistle stop. So there were a few known locations and then there was a great deal of country in between, in the hilly section of western Wisconsin and as I rode along on the train, looking out of the train window, I would try to spot likely places. Then of course, I would get off at a particular little station and hike up to the bluffs which were several miles away and load up my pack with specimens, stay overnight at a little bowl and pitcher hotel, of which there was one in every little town in those days. Of course, they weren't

supported by bars as they are in Canada. As a result I did collect a lot of valuable material and of course, it was terrific for my own education and of course, one that I mentioned previously and perhaps certainly could rank as possibly my most exciting discovery was the discovery of these little known fossils called Merestanata???. Well, they're not really Merestanata now but I'll go into that later. Anyway, they were very little known but I was particularly fortunate in finding one large individual that had the appendages, you know, the legs and all of the underside of the body preserved. This as I mentioned earlier, this I published in 1939 as my Cambrian Merestanata. One thing that disappointed me was the fact no one apparently was paying any attention to it until I received the publication from the Palaeontological Association of London, a series called Palaeontology in which my friend and colleague, Dr. Harry Widdington???, formerly of Harvard was one of the authors. They reviewed my paper, in fact they restudied the more significant specimen and they disagreed with me on 2 or 3 points and I was delighted that they only disagreed with me on 2 or 3 points and not on all the others. So I was quite gratified because I was just. . .was I an undergraduate, yes, I was just an undergraduate student at the time. No, I was an undergraduate student when I discovered them but I was a graduate student when I finished the manuscript. So I wasn't displeased at all. I'll just use the one sentence which sort of will pin it down for the record. This is from the article by, I should give all the authors credit as well as Harry Widdington, just one second I'll have it for you. . . Yes, the authors are D. E. G. Biggs, D. I. Drayton also and of course, my friend, H. B. Widdington. I'll just read you this one sentence from the publication which will sort of pin it down in space and time. Quoting, the original description and discussion by Raasch was based on 60 specimens, most of which came from what he termed the narrow stone parting, in the low dimember???, St. Lawrence formation at Point Jude, 3 miles east of Gotham, Richland County, Wisconsin. So that really was quite a find. It was an addition to, well, to paleo-biology, a major addition to paleo-biology. I was very happy to have been involved in it. While I was at the University of Wisconsin as curator of the Geological Museum there, from 1929 to 1936 I had sufficient time and certainly more than sufficient interest to go into the field and to study the stratigraphy of the sedimentary deposits there, which range in age from Cambrian, well, in the state of Wisconsin, to Devonian. I made considerable contributions to the tracing and correlation and fossil content of, especially, the Cambrian and the Devonian beds. My Cambrian contributions have been published in a number of places, either by myself or with co-authors. And the Devonian was published in just a single publication. Actually My Summer With the Cambrian and also My Summer With the Devonian of Wisconsin are both published in a guidebook of the Kansas Geological Society. That was 1935 and it's the 9th Annual Field Trip Guide Book, which was all in all, quite a volume on the geology of Wisconsin and Minnesota and Iowa. After I left the University of Wisconsin and went to seek my fortune in the oilfields of Oklahoma and Kansas I had a thrill or two. One of course, I think well, the most particular one really was the discovery of rich beds of fossil insects of the Permian age in north central Oklahoma. The irony of it is that I first discovered these little fellows, I mean primarily they would be wings of course, sometimes you get a whole insect but mostly there would be wings preserved, I first found this when I was working

on the geology of the Billings oilfield, in connection with a wider project which I also mentioned earlier on, in which I outline a neighbouring oilfield which hadn't as yet been discovered. It was right in this oilfield that I began to find these fossil insects. They were rather sparse compared to what we found later but there was sort of a human interest story there because this was 1939. At the end of the Depression but the beginning of mine you might say. My wife and 2 daughters and I were living from day to day, wondering when our money would give out, which it did soon after, but that's another story. In fact, to extend our income I, after I collected a number of these specimens I got in touch with Ward's Natural Science Establishment in Rochester, New York and they are a scientific supply house, who also sell significant fossil material to the appropriate places. And they were paying me $1 apiece for these and I think I discovered, at that time, at least 20. So that over a period of a month or two I received an income of $20 which was quite
#135 significant. The only problem was I flooded the market. It turned out that they were selling these specimens in turn to Dr. Frank Carpenter, the Maryland specialist in fossil insects at Harvard University. So somehow they got together, they gave him my name, and he got in touch with me. By that time I was back at the Milwaukee Public Museum on a small subsistence job. So we went back to Oklahoma and we traced this bed over quite an area and of course, with all the ins and outs of the outcrop it went for many, many miles and it got very much richer as we traced it eastward. So that, by the time we were through we had collected over 2,000 specimens. Some of them were quite spectacular. Especially of course, the big insect of that time or the big insects, belonged to the dragonflies or Odonata???. We picked up one wing that was about 8" long but we also picked up a portion of a wing which would be closer to 2'. So this is quite an animal. I don't know whether I would want to be walking around where there are dragonflies with a wingspan of 4' you know. But all in all, that was an exciting experience and one I think I also made a contribution. I think it's . . .well, it is definitely the largest deposit of ancient??? fossil insects in North America, possibly even the world. Of course, later on, in the Mesozoic and the Tertiary they have found rich deposits but for the really old stuff, this was quite significant. Some publications have resulted but then, unfortunately Dr. Carpenter developed other interests so most of the material is still sitting down there in Harvard. I suppose, while in telling human interest stories and also I suppose it is a contribution, the material that I made while I was doing the research on the Cambrian and Ordovician and Silurian and Devonian in Wisconsin while I was at the museum which I personally collected, I was able to take with me and to finance my search for oil down in Oklahoma, why I sold this collection to Princeton University and to University of Michigan and got the fabulous sum of $1,200 for it, which sustained me for a year while we were looking for oilfields, one of which we eventually found as I mentioned but unfortunately we weren't able to exploit. So that somebody else found it be accident later on. Of course, eventually came the war and by that time the employment situation was very tight in any case. I was emotionally involved I guess, in the struggle so I applied for an officers commission and was picked up by the Air Force as an intelligence officer. I was by that time, 39 years old and I had no flying experience or anything of that sort so I think they were wise in putting me where they did. It was a very interesting place to be. I

got into Supreme Headquarters in North Africa first of all and later on, after an interlude back in the United States at another type of assignment I went back to northern Europe to France and Germany in connection with the air intelligence section of Supreme Allied Headquarters, SHAEF as they were called. I felt I made a contribution there because my assignment, I spoke of this somewhat briefly earlier on, my assignment was in the beginning it was, I studied enemy transportation and how to disrupt it. Later on I became more specialized into enemy road and rail, in other words, land transportation. It seemed perfectly obvious to me that the thing to do, am important aspect shall we say, of disrupting enemy transportation would be ??? of the battlefront from the hinterland and from supplies. So I pushed this very strongly and it was very hard to get the Air Force, the operations people, to concentrate of cutting the rail lines themselves by bombing. After all, these are rather slim targets, just a single or double track rail line going across country.

#203 They greatly preferred bombing flat targets like marshalling yards and repair depots and things like that. But they were finally convinced. This thing was called Operation Strangle by the press who got on to it. Of course, now it's a standard procedure on any type of a military operation on a large scale. I didn't know, because ???come up with a new idea, which I was amazed to find was considered a new idea and when you're only a lieutenant and you had no previous military experience and it seemed so simple, which it was, why they sort of looked askance at you and to some of the people higher up you're just sort of a buzz fly you know. So I never knew that I was going to be sent away to some of the places they sent officers they didn't like. So they had a few unpleasant places they could send you, just simply reassign you, they didn't have to charge you with anything you know, anyhow they didn't like you, or what. But I did finally get my decoration which I mentioned earlier on, the Bronze Star medal. It's not a great decoration but the citation mentioned that I'd made a contribution to military science. I'm paraphrasing, I don't know whether those are the exact words and I don't have the orders now but there's a human interest story in even how I discovered how I'd won a medal. I'd mentioned earlier on that I went back, I was first in North Africa and Italy, in the Mediterranean theatre in other words, then I went back to the European theatre. There again, I was attached to Air Force intelligence and one of our missions, this was immediately after the German surrender, one of our missions was to locate the Japanese diplomatic personnel who were interred by of course, the Allies at this time. But it was rather unclear as to where they were interred and how many there were and so forth and so on. So we were sent on to, I believe it was entirely Italy, yes we were sent to northern Italy to try to find out where these people were and who they were and various statistics and we found them all in one place, I think it was a little town, perhaps a resort town called Montecatini. There we found them and much to my surprise they weren't all yellow dwarves with big teeth and suicidal tendencies, there were some quite pleasant people among them. But we weren't really interrogating them, we were simply taking down their, well, we might say, their vital statistics. Well, the reason I'm telling that was because, in the course of that, we dropped down to what had been the headquarters I'd been assigned to previously at Dreselta???. One of my old officer colleagues was still there, a good friend of mine and

he said, I'm glad that you won the medal. I said, what medal, he said, didn't you know about it, I said, this is the first I've heard about it. Oh he said, they gave you the Bronze Star medal, call in at whatever the department was and I'm sure it's there and sure enough it was, it was on a shelf. He blew the dust off of it you know.

#258 NM: And you did not know.

GR: I didn't know. And he said, well if you like, we'll put on a parade this afternoon and we'll give you this formal decoration. I could just see that you know, that didn't appeal to me at all, especially after the shock. Well, do I have to go through this parade, oh no, we can just give it to you. I said, well, you better just give it to me then. So that's how I won my medal. I don't know if I hadn't accidentally gone back to the Naples area whether I ever would know that I had a medal you know.

NM: And you never received a formal letter?

GR: No, never received a formal letter. Of course, there were the orders cut for a group of people who were being awarded medals and I got copies of that and that's all, otherwise I couldn't even have proved that I . . . So that's the way things go.

NM: That's a great achievement too.

GR: Well, I suppose so. Certainly I think so. But now everybody knows it so they say, what's so great about that. Well, I came back and finished my education and got my PhD, which is really equivalent to a Doctor of Science degree, from the University of Wisconsin, with the help of the federal government through my war efforts. Then I went down to Illinois State Geological Survey, at Urbana, Illinois. I mentioned this earlier in the primarily public relations job but I did have a lot of extra time on my hands so I got to writing up data that I had accumulated in the past on the Silurian in Wisconsin. It doesn't stop at the state border so I got to tracing it from this state to that state to the next state and I prepared this for presentation at one of the geological meetings and it was suppressed by the head of the Survey because that was not my department or my sphere of effort. But of course, I felt that under scientific and academic freedom I had every right to publish it. So having lost the argument, I quietly looked around and when I found an appropriate position, why, I sent in my resignation, which was very polite and didn't mention the real reason why I was leaving. And that's how I wound up, up here in Canada. This was a whole new world. By the time I got here I was 50 years old and I took my first trip out to the mountains. When I saw all those outcrops, thousands and thousands of feet, I said, oh no, I should have come up here 30 years earlier. But nevertheless I busied myself with looking at the geology and I got especially interested in the Mississippian beds near Highwood Pass, which I have subsequently published. So my first achievement you might say, and my first achievement leading to publication, was a zonation of the Mississippian beds here in the Canadian Rockies. Eventually I published in collaboration with Dr. Peter Harker of the Geological Survey of Canada. This was published in 1958 by the American Association of Petroleum Geology. A special volume prepared in honour of John Andrew Allen. John Andrew Allen incidentally, is of course, the professor and geologist after whom Mt. Allen of coming Olympic fame was named. The book is entitled The Jurassic and Carboniferous of Western Canada. The reason that I've been fairly proud of the

Mississippian around here was the fact that I'd come from the Mississippi Valley in connection with my work with the Illinois Survey of course, and it's the Mississippian of Illinois and Missouri that's the classic type area. I also brought with me a volume on the Mississippian thottle??? brachiopods and I think I was the only one out here in western Canada who had such a volume so naturally I became the authority.

NM: This is the end of the tape.

Tape 3 Side 2

GR: One of the achievements, I wouldn't say a major one, I was able to make, as editor of the Journal the Alberta Society of Petroleum Geologists, that is our local society which since as changed its name. This was a subject, a theme that had nearly become respectable and this special publication was called Polar Wandering and Continental Drift. This is also one of these things that everybody accepts now but in 1958 it was rather daring to come out with this sort of publication because the previous geological thought had it that continental masses could not move because I was told, in university, the physicists said that if such a thing happened the earth would fly apart. So that was that and I didn't certainly want to take on the physicists. But here was new interest in this. I spoke of this earlier on, there was new interest in this at this time so we did issue this special publication, which was, well, it was really the precedings of a symposium. That is we had a meeting here of specialists involved in this and of course, now it's simply accepted and the laymen are talking about plate tectonics but I don't think the word had even been coined at this time in 1958. I'll read some of the titles into the record and I suppose I should read the men's names too to give them due credit. One was Possible Causes of Continental Drift, that's by a physicist. So we had the physicist on our side finally. That's by Dr. A. E. Scheideger. There was another article called Orrocline??? Concept and Continental Drift and that's by D. W. R. Wilson, who was my colleague, in fact we sat at opposite desks in Shell at the time. I think the symposia was really his idea but I backed it. There was one here on Thickness of the Earth's Crust in the Alberta Plains by T. C. Richards. Another thing that ??? the idea of the movement, not only the movement of these blocks but of course, their rotation and the degree of their rotation was realized by means of . . . what would the process be called. . . paleo-magnetism. Of course, these sediments developed their magnetic orientation at the time of the formation of the sediments. And they retain this and if they are moved and disoriented. . . in other words they lost that orientation, the polar orientation, and if they are rotated the come off of this original orientation and you know how much disturbance there has been. And in connection to that, of course, they also became interested in the wind direction of these ancient times. So there were 2 publications resulting from that, one of them was mine, one was on fossil winds by ??? and the other one was ???, that's down in Wisconsin, it was an old hill of solid quartzite that stuck up into the Cambrian Sea you see and certainly would have caught the winds. The ??? and Paleo Wind Direction and that was a contribution of mine in this connection. So that was rather fun. I would have to take only partial credit there I think because Derrick Wilson and a few others, including me, were

back of this symposium idea. Then in 1961 of course, there was a publication of which I was editor and of which I spoke previously, which was the publication of all the papers that had been submitted to the 1960 1st International Symposium on the Geology of the Arctic. I just thought I better throw it in here because . . .

#052 NM: That was very important.

GR: It was very important and if I'm discussing achievements I think it belongs there. I was a member of the organizing committee to start with and then I got the job of editor. So that was quite a contribution and I mention on the human interest side how this was the first geological conference that ever brought the Russians to Canada.

NM: So that's very historical.

GR: It's very historic. It was very thrilling at the time to see these, well, people almost from another planet we thought you know, and they turned out to be quite human. A major contribution which I made but which has not yet seen the light of day, if it ever will, was requested by Shell Oil company when I was a full time consultant for the company. This was to develop a fonal zonation, you know a bio-stratigraphic zonation for the Ordovician of North American, north of Mexico. A committee had been struggling with the same problem for about 30 years but of course, committees don't move as fast as an individual can. So we got this out in about a year's time and the committee's report came out shortly after and I thought it was rather antiquated. But of course, you know the famous story about how a camel is a horse designed by a committee and I think in some of these cases, this is what happens. But anyway, it's still in the Shell archives I hope. Of course, now it would be a bit out of date, I don't know if I mentioned this or not. In 1966 I received what I thought was a rather nice bit of recognition and also a very pleasurable experience. The West German government had organized a, well, the West German government I should say, through the medium of, I'll give you this in German, through the medium of the Institute Fuar Palaeontology, ??? Frederic-Wilhem Universitat, in Bonn, West Germany. They organized this field trip on the classic Devonian outcrops in West Germany, along the Rhine and eastward and invited 5 geologists from Russia and 5 geologists from Canada. I was very pleased to have been selected as one of those 5, especially since I really wasn't a Canadian then as yet, but still an American citizen but they said, well, we think of you as a Canadian so you better come along. Which I did and it was a real pleasure to, on a trip of that kind of course, where we'd travel and we'd stay overnight various small hotels in these communities. Of course we'd have meetings of the sponsors and leaders of the trip, the Germans and the Russians and the Canadians, we'd have evening meetings. We got very well acquainted with these 5 Russian geologists who were very delightful people. As a result the Russians sent a delegation to another international symposium organized by the local society here in Calgary, on the Devonian deposits of the world. And that was a very big thing. So these people returned, in fact they returned with, well, in fact they had a delegation of about a dozen this time, including all of my old friends. So we had another delightful time getting reacquainted and it turned out to be quite a profitable thing in the long run. Well, I'm really beginning to run out of exploits. I suppose high time but in any case.

#100 NM: All that was very impressive.

GR: Well, thank you. It's marvellous to find someone to talk to about it and I guess I do enjoy thinking back over all those years. But bringing it much closer to the present, the 3rd International Symposium on the Geology of the Arctic, this has now become sort of a tradition you see. Really now, well Canada has had 2 and the United States has had 1. I don't know if we ever get back to where we're speaking to our Russian colleagues without political interference, why, perhaps we'll have one in Moscow. But in any case, in 1982 in connection with the 3rd International Symposium on the Geology of the Arctic, which unfortunately this time the Soviets boycotted at the last minute, so that I didn't have a chance to see my friends again, I published a paper on, I think I mentioned this earlier too, on the fonal zonation of the lower and middle Devonian of the Canadian Arctic Islands. By now in fact, really ever since I joined Shell and before by natural inclination, I'd been known, my chief geologic interest has been in setting up a detailed time scale. So I keep working at that. This was published for the Canadian Arctic Islands. Now I have in progress a similar treatment of the ??? the fonal zones in the upper Devonian out here in the Canadian Rockies and that's pretty well along in manuscript. If I can get enough support, my maps and illustrations prepared, I hope in the not too distant future I'll see that in the press. That about sums up what I consider my major exploits.

NM: That's a very long list.

GR: That's a long life.

NM: Who were the most influential persons in your career?

GR: The most influential persons in my career began with 3 whom I never met and only one of whom I saw briefly one time as a visiting lecturer. The reason these men were influential was that as a boy in high school my only contact with the profession which came later on, which I'll mention, well, with a professional geologist in those early days, was with the curator of the Public Museum of Milwaukee. Before that my interest drew me to the science room in the Milwaukee Public Library. There were 3 publications which were especially influential in my sort of, solo or self education. This would be I don't know, I suppose this would be when I was anywhere from 12-15 years old. One of these was T. C. Chamberlain, that's the great Chamberlain, who along with Molton, later was the author of The Planetismo Hypothesis of the Origins of the Earth. But this work that he did was published, I believe it was in the 1870's for the Wisconsin Geological Survey. He described the ??? outcrops, at least the more prominent outcrops in eastern Wisconsin, which is of course, where I lived. He did very good work and in addition to describing the rocks he also described the prominent fossils and used them in connection with his stratigraphic work, which is something I've been trying to do ever since. So you might say that he was one of the influential people in my life. And I did see him, he was still alive when I was a boy and I did hear him when I was a freshman at the University of Wisconsin, he came and gave us a lecture. That was my only physical contact with T. C. Chamberlain. The other two I never did meet. One of these was James Hall, the famous palaeontologist of the state of New York who published volumes and volumes and volumes of course. And whose books I used to lug home and look at on the street car on

my way home from the library, I'm sure much to the amazement of whoever was sitting beside me. These huge volumes in my lap you know. The third one, and this is most fortunate, the third man was a Dr. H. F. Quinlan???. Quinlan engaged to describe the Devonian fossils along the river a couple of miles from my home. So I had the privilege, the fortunate situation really, of being able to go up the river and collect my fossils and then identify them with the help of this book. I learned the vocabulary backwards, I'd look at the fossils then I'd read the description and say, oh that must mean that and that must mean that you know. And then of course, they had a lot of them on display in the museum, the museum and the library were in the same building. So there was this. . .

#168 NM: You were teaching yourself a lot.

GR: Well, yes. It was the coincidence of the outcrops and the library and the museum all within a radius of a few miles you know. Let's see, there was something else I was thinking about but in any case. Oh yes, I did want to throw in a few remarks about the influence on environment and shall I say, propinquity on a young fellow's becoming a geologist. Especially in the stratigraphic field and the palaeological field. The place a person is born has a great influence on whether or not he goes into geology. The most fertile area was the Cincinnati area, along the Ohio River, both sides of the Ohio River, where fossils simply roll out of the bluffs of the river you know. Many of our great palaeontologists came from there because they got interested as boys and of course, I suppose there really were older more experienced palaeontologists there too, and made their contacts and went on to college and became very prominent in the profession. In the state of Wisconsin it's not quite as well marked as that. Well, I just gave one example, me, but when I was in university studying geology a lot of my classmates had come from a place about 40 miles east of Madison, which is where the university's located, at a place called Lake Mills. Lake Mills was adjacent to a prehistoric Indian site, called Aztalan, which the public museum of Milwaukee, which was another 50 miles east, systematically excavated on successive seasons over a long period of years. Evidently these kids from Lake Mills or from the surrounding farm lands would have been intensely interested in this activity. I guess some of them probably were even hired for more, you know, more, well, I won't say menial but unspecialized jobs you know. And they developed an interest in anthropology and in excavation for artifacts and so on. Well, the university didn't teach anthropology and the closest thing to it was geology. About half the graduates I think, that made a name did come from this particular area of Wisconsin. So I think it's very important you know. And very important too, in those days anybody could pick up fossils anywhere without running into government restrictions. I don't know whether that's going to handicap the production of geologists or not. But the point I make is really, many of us developed an interest in geology long before university age. The actual person, I mean physical living person who was influential and he was most influential in my going into geology was Dr. Ira Edwards of the Milwaukee Public Museum. I mentioned him just a bit ago. He was curator there and he'd just come from the University of Rochester in New York state. This was his first job. Of course, I wandered along the river banks, during vacations, weekends and so on and I never expected to see a real living geologist.

He loved to tell this story, he could tell it better than I can but anyway, I'll try. And here lo and behold from the opposite bank of the river, there was a bridge handy, from the opposite bank of the river here was this, I knew he was a real live geologist because he had on high top boots, a slush hat and he had a suite of hammers and chisels and he was working away on these rocks you know. I was pretty shy, I was just a rag muffin kid anyway, I was pretty shy but this one I was not going to miss. So and this is the way he tells it, all of a sudden here this kid jumps up, I guess I must have been maybe 12 years old. This kid jumps up and he stands out excitedly, I know where there's a big [gyrosis aryx]???, it's in a big block of rock but I'll show you where it is and if you get it out you can have it. And this was my device of introduction. And of course, I assumed that he would know what a gyrosis aryx was, I assumed that he knew the name of all the fossils in the world you know. But he didn't, but he. . .

#235 NM: What was his reaction?

GR: His reaction was of great surprise and great delight too, at this unforeseen experience. The gyrosis aryx I might explain, is a nonaloid??? cephapod, a coiled one you know. And it was in this great big block of limestone and I'd look at it. It was far beyond my powers to ever extract it. So that's how I met the man who was really. . . well, I suppose it's just quite possible that if I hadn't met him I'd never have found a means or a device to go into geology. He undertook my informal education from now on and finally, by the time I was 16 I had a weekend and holiday and vacation job at the museum, as an assistant. Then as a matter of fact, well now, this gets me to the next man but it sort of fits in sequence also. Another man who was very influential as far as I was concerned was Dr. E. O. Uhlrig??? and he was the palaeontologist in Washington with the United States Geological Survey. He was engaged every summer for a number of summers, to come up and help the geologists of the Wisconsin Geological Survey to interpret this geology in Wisconsin. Our ??? was about as long on the first trip and he collected a number of specimens from the Cambrian sands out on the western part of the state. Then in 1920, when I was 16 years old. . . well, shortly after he'd hired me, he took a leave of absence and went to the University of Texas for a year. And he left me with these specimens to identify. So here I was, 16 or 17 years old, identifying. . .

NM: What an experience.

GR: Well, it was really. I guess fate was most kind. Then later on of course, I also was able to go along on these trips. Well, there was a very interesting development and possibly we can talk about that next time but I'll leave that up to you, we won't discuss that now. At that time, this part of the field of geology was divided into 2 camps and they were very bitter, very hostile camps. Incidentally the chief protagonists had both come from the Cincinnati area and both of them were palaeontologists. In fact, both of them were very good friends at one time and later became bitter enemies and one of these was E. O. Uhlrig who I mentioned, who was the chief palaeontologist with the US Geological Survey and the other one was Dr. Charles Shuckert???, who was in charge of ??? palaeontology and stratigraphy and so on, at Yale University. Everyone else was either in one camp or in the other camp. Of course, naturally I grew up in the Uhlrig camp because

that again, was propinquity, I just gravitated there. Then I went out to the University of Wisconsin, the next man who was a considerable influence was Dr. W. H. Twinopal??? and he was one of the principal students and disciples of Charles Shuckert, so he was in the Shuckert camp. So here I was, coming quite obviously from the other camp, as a protege you might say, of Edwards and of the state geologist, the head of the state Geological Survey and of course, I was looked at with considerable skepticism. Well, I began poking around and I discovered that unfortunately my camp and my sponsors were not right, they were wrong. And the place where the everlys??? came up was immediately across the lake from the university itself, in an outcrop there. Now these men, they knew they were right but they couldn't prove it because they hadn't done enough Cambrian palaeontology to prove their point. And of course, I was in a very awkward position. But eventually it did have to come out, that no, I thought they were right and . . .

#308 NM: How did you do it?

GR: This is rather involved and this involves something that is historically important is a very dead subject today and that's what Uhlrig set up and called the Ozarkian??? system, which was something that was supposed to be intervened between the Cambrian and the Ordovician, which was the normal sequence that everyone recognized. He found certain fossils in Missouri, which he said were not Cambrian, they were younger than Cambrian and found those same fossils in this outcrop on the opposite side of the lake. But a recognized fossil ??? for identification of the Cambrian was a big trilobite with a couple of spines on the tail called dikelocephalus and that no one could claim was anything but Cambrian. Well, I found the dikelocephalus in beds on top of the beds that had what he insisted were younger beds and belonged to the Ozarkian system. And really was sort of the beginning of the Ozarkian system.

NM: This is the end of the tape.

Tape 4 Side 1

GR: On this matter of the Ozarkian system of course, which didn't concern just Wisconsin and Missouri but really, all of North America including western Canada, you'll find this in the earlier reports by Uhlrig and by C. D. Walcott and other ??? workers but you won't see it today. But it doesn't give me any particular satisfaction because I was very fond of Dr. Uhlrig and of course, I thought I owed him a lot because he was one of my early sponsors and you might say, informally, one of my early teachers. But I had to modify some of the things that he taught me, subsequently on the basis of experience. But anyway, I didn't think anyone, so far as I know, no one openly attacked the concept of the Ozarkian system except myself. And I tried to do it as gently as possible because I was trying not to offend anybody which was not successful of course. And it was in this same guidebook by the Kansas Geological Survey, of the 9th field trip, 1935. It was to that that I submitted this article and it was entitled the Palaeozoic Strata of the Daribou??? area. But of course, that and also the outcrop directly across the lake from the university, which was in a place called Mendata Bluff and this Daribou area were the 2 key areas that Uhlrig used to

establish his Ozarkian system as far as Wisconsin was concerned. I was just noticing in sort of. . .well, glancing through this article which I wrote in 1935, I say here, quote, for it was on the dikelocephalus bearing low ??? shale of this region that the lower Ozarkian was destined to shortly run amok. So that was out, that was the statement. Uhlrig, before he was familiar with the Wisconsin upper Cambrian formations in the field rightly regarded the fossils from the St. Lawrence as having lower Ozarkian affinities. What he did not know at that time was that these lower Ozarkian forms are in the upper Mississippi region, overlaid by beds carrying the famous dikelocephalus. Universally, but with little justification, hailed to be the type fossil for the upper Cambrian of the Pacific province. Accordingly he drew the base of his Ozarkian in this region at the base of the present Trempalo??? formation. It was about as good a selection as could have been made and far superior to boundaries postulated in subsequent emendations. End of quote. That was just to try to soften the blow you know. So I guess that was another accomplishment of mine, over which I had mixed feelings. One of the net results of this business of 2 camps and my being the turncoat was that they didn't like me very much in the Uhlrig camp and at the same time they didn't particularly respect me, perhaps because they thought I was a turncoat, in the Shuckert camp. So I sort of fell between the chinks there for awhile but I managed to survive and continue my career for some years, as is obvious, since here I am. So I guess that might wind up that discussion of the Ozarkian.

NM: This is the end of the third interview with Gilbert Raasch.

Tape 5 Side 1

NM: This is Nadine Mackenzie speaking. This is the fourth interview with Mr. Gilbert Raasch. Mr. Raasch, looking back at your career in the oil industry, or here in Alberta, what do you think of it?

GR: Well, I've been perfectly, when I say perfectly happy, I don't mean I've been ecstatic but I mean I've been quite content, perhaps is a better way to put it, to do my business and carry out my career here in Alberta. I've been here now I guess as I've indicated, over 30 years, and I've never felt particularly like going elsewhere. As far as geology in general is concerned, well, actually I started out as a boy and it was my hobby so you might say that all my life I've simply been following my hobby, which is a pretty lucky thing and doesn't happen to everyone. So there again, why, I'm quite content. And witness the fact that despite my age I still haven't retired, it's the thing I most want to do still. I do think, looking back, this is before coming to Alberta and being associated with the oil industry but looking back I often wonder if teaching wouldn't have been very satisfying for me.

NM: Did you ever try teaching?

GR: I never did, no. When I was younger. . . well, it was the influences of people around me too, in the profession, that didn't like teaching and they sort of turned me away from teaching. Then in later years I thought, wouldn't it be nice and of course, personally rewarding also, to have had students and to have communicated because to a considerable extent and especially now that I'm consulting on a small scale and on my own, I'd like somewhat more human contact. But that's the only thing I think, that I might do

differently if I were doing it all over again. But then you never know if you'd taken the other fork in the road, you don't know where you'd wind up eventually anyway.

NM: You might not be here in Alberta today.

GR: Well, that's the other thing. And here I am, perfectly satisfied, so I have no complaints.

NM: What about retirement, are you planning one day to retire or . . .?

GR: I suppose the time may come when I'm physically unable to crawl down to the office. But not really, I just don't know. Of course, my wife, having died recently, I'm just sort of waiting to see how I'm going to feel, say, 6 months from now. I may want to pull up and leave. The winters are long in Calgary but then again, the summers are beautiful. Going back to the United States, it might be the other way around so there isn't all that much to gain. So I don't really know what my plans are but I certainly have no definite plans to retire. Of course, I suppose one might say I'm semi-retired now but that's partly because there hasn't been much demand for services. So I work only half days at this time and of course, during my wife's illness that's about all I could manage in any case. So I'm working only about half time so in a sense I suppose I'm semi-retired but economic circumstances could even change that.

#040 NM: You do some consulting work?

GR: Oh yes, I still get small jobs. But really not enough at this time to quite pay my expenses.

NM: That's a problem now.

GR: Yes, it is. It helps reduce the cost. Of course, if I lived elsewhere I'd also have to be paying out money to live, you have to pay to live. So actually, I'm quite. . .well, I could do with a little more paying work. On the other hand the work that I do that I'm not paid for is the work I choose to do and personally, that's even more rewarding. Even if it isn't financially.

NM: Have you also noticed that people in the oil industry don't retire as they do in other professions, they just slow down?

GR: I think that's true of a great many. I've known a few who really surprised and shocked me who retired at, let's say, at their retirement age, shut the door and never looked at geology again. But maybe they had something that they preferred to do. I think most geologists are pretty dedicated people.

NM: So you think it is for this reason that they go on working?

GR: I think so, yes. It would be true of me. There's nothing I would prefer to do, I wouldn't want to spend the rest of my life golfing and fishing, maybe some people would. Of course, at my age, skiing becomes a little dicey.

NM: Are you still writing articles, publications?

GR: Yes I am. I have 4 manuscripts in process now that I hope to finish up.

NM: What are they on?

GR: Well, of course, they're all on bio-stratigraphy, directly or indirectly. At my age there's no use writing for reputation because if you haven't got one by now you'll never have one and of course, the kind of things that are published in professional journals bring no money. In fact, they cost somewhat. So really, I think . . .well, I have a great deal of raw data that's accumulated over the years and the decades you might say and I hate to see it

going to waste. Certainly no one else would want to take over my notes and I can sort of see them dumped into the ash bin.

NM: That would be a pity.

GR: Yes, it would, I feel it would be a pity in any case. So I'm trying to get as many things of that sort in print as I can during these years. And that keeps me going and I enjoy it besides.

NM: That's very important too.

GR: Yes.

NM: And this is the last question, Mr. Raasch, on the whole what do you think of the oil industry?

GR: Well, since I have been, first of all, pretty strictly a geologist and even in the field of geology, somewhat specialized, I wouldn't presume to give an overall opinion of the oil industry, except in a very general way. It's, like mining and other resource industries, it tends to be a boom and bust or at least an up and down industry. I think people that go into it should expect this. It's almost the norm. I think it's preferable to the attempt of governments to bolster up the industry during the downs and control it during the ups. Because I think that just destroys and disorients the whole economic structure.

NM: Would you recommend this industry to young people nowadays?

GR: I certainly wouldn't discourage them. I might give them some, well, a bit of warning as to what they could expect but I think if you look over the past 50 years or more, it will have its upswing. Now I'm not going to predict when or how much.

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GR: Nobody can. But it is a non-renewable resource and there's times at least, and it depends on exploration and discovery, and demand. So it's bound to fluctuate. The difficulty is with students in college, in a period like this say, they are discouraged from going into petroleum geology, discouraged by the establishment or by the authorities in the college because there are no jobs in sight. So they enter and 4 years later, maybe they're in a boom, then there are geologists in sight. This is one of the things that happens quite. . . well, that's almost, shall we say, endemic to the industry too.

NM: For the moment there is a surplus of geologists, young geologists.

GR: Yes, there certainly are yes. As there are of petroleum engineers of course. But that can change. It changed very rapidly downward, it can change pretty rapidly upward, depending to some extent on world events. And I don't want to predict what they're going to be, they could be a mixed blessing too. I believe kind of in the individual. I mean when I was young I was absolutely determined to be a geologist, by the time I left primary school I knew what I wanted to do. If I had entered during a down period and they said, no you can't be a geologist, for me that would have been disastrous. Of course, many individuals, when they're in university, haven't yet made up their mind what to do and that's quite another thing. But if you have this strong feeling of, as they say in religious circles, vocation.

NM: That's right. And you had this. . .

GR: I had it, yes I did. I don't know what would have happened if they'd shut the door in my

face. So those are just a few random thoughts.

NM: Mr. Raasch, I have really enjoyed interviewing you, thank you very much.

GR: Well, thank you, I've also enjoyed it, I think it's a privilege and a pleasure.