PETROLEUM INDUSTRY ORAL HISTORY PROJECT
TRANSCRIPT

INTERVIEWEE: Charles Stelck

INTERVIEWER: Susan Birley

DATE: September 1984

SB: It's September 13th, 1984 and this is Susan Birley interviewing Dr. Charles Stelck at the University of Alberta. Dr. Stelck, could you just start by giving us an idea of your early background, where you were born and raised?

CS: Well, I was raised in the city of Edmonton and because I was born on the flat plain the first fossil I ever collected, which I still have, was on a railroad ballast, on the railroad track. I didn't know what it was for another 20 years but I kept it in any case. But because I'd never seen bedrock, I didn't even know what the word geology meant when I came to university, but just for fun a couple of my friends decided to take geology as an option. It was the Depression and of course, walking home every day with them, the miles that we had to walk, they would repeat Dr. Warren's geology lectures to me with great enthusiasm until finally I could hardly wait for the second year to register myself.

SB: Was the first year just a general course?

CS: I was going into chemistry at that time and taking the pre-requisites for school teaching. For a geologist I have a peculiar mixture of psychology, philosophy and chemistry and physics and math and everything else that wouldn't ordinarily be expected in your background.

SB: And who were your 2 friends?

CS: One was Dr. Follensby, who later on became a member of the department here after graduating in geology, after switching from law because he was so brain washed by Dr. Warren. Dr. Follensby by the way, finally became the head of the International Geological Congress. He became the head of the Geological Society of America and he became head of the Royal Society of Canada in turn, much later. The other companion was another boyhood chum, who became Judge Morrow of the Northwest Territories. So they led me astray, I was in geology from then on. The classes were very small, the class I graduated with there was 4 graduating students and we had very much the personal attention of the 3 great geologists that founded the department, Warren, Allen and Rutherford. We were almost personally tutored by these men, we realize it now when we look at the classes of 80 today. So we were not without good background and when we went on to graduate schools of course, we realized just how excellent our preparation had been in comparison to other colleges.

SB: Who were the other 3 that you graduated with?

CS: Joe Gleddy, Bob Follensby and man by the name of Mason. I've not followed his career but I do believe he went into hard rock. Of course there were no jobs in the Depression, although Follensby did manage to get a job before he graduated one year, with the expansion of the Survey projects, a make work proposition, in 1935 or '36. However, I

did not get my first job until '37, after graduation. That was with Frank McLaren. We went on up to the Peace River country, for a city kid that had never been out in the bush it was quite an exciting trip.

#051 SB: What were the camp conditions like, did you have to catch your own food?

CS: No, we had more or less supplies because even though it was. . . the homesteaders were in there, there were trappers in there, it wasn't completely isolated. We went up into the Peace River country, went up by the old Edmonton, Dunvegan, British Columbia Railroad. I can still remember wondering whether the train would stay on the tracks going down through that great big slide area down on the Smoky River, down to Watino and back up the other side. They didn't maintain the grade as fast as the landslides took it out. When we got to Dawson Creek, of course, that was the end of steel there at that time. If there were 1,000 people there I'd be surprised. Went by truck to Taylor on the Peace and of course, at that time, there was just the ferry there and as there was no road to Hudson Hope we went by boat upriver. One of the interesting things was I noticed that as we went upriver we passed the site, the upper end of Taylor Flat there, the rocks were perfectly flat. Now that was a peculiar things because rocks very seldom are perfectly flat. This was the first time I noticed the St. John Terrace, but I was thinking of this for a couple of years, that that flatness was unique in there and it would later on be the way I could indicate where the St. John structure would lie.

SB: Was that because of the type of rock?

CS: Well, it was perfectly flat. And if you put a wedge underneath, of course it will reverse the flatness to a dip the other direction, which will make a trap. But of course, at that time I was just all eyes. We went up to the Hudson Hope and Hudson Hope was the cleanest, whitewashed town I'd ever laid eyes on. But then that's where they made the lime that supplied all the Hudson Bay forts, all the way down to the Arctic. Because there's a lime spring there at Hudson Hope. Very pure lime and they made whitewash base and everything out of that.

SB: There was kiln there for awhile, an old lime kiln.

CS: Yes. When we went about there of course, we walked over the portage to the upper river which is now of course, Lake Williston and we went upriver, in a long river boat about 43' long and about 3-3 ½' wide, so it could snake through the rapids and I became pole man.

SB: Did you have any local guide?

CS: Yes, we had the Gething's themselves, after which the Gething formation was named. They were our boatman, our friends and we became sort of an adopted part of the community up there. And of course, all the stories of Big Bill Adams and those, how he could carry a 400 lb. mine car up a mountain and so on, they all burned into my mind, I was a convert to the bush from then on. We collected thousands of fossils that summer, McLaren was such a gentleman, such a gentle soul that you thought that was about the ideal existence. So I was converted to palaeontology at that time.

SB: And he was working for the Geological Survey?

CS: He was an officer of the Geological Survey. We had almost I suppose, an idyllic existence

if you want to think of it that way. We were working from the river, we worked all the way up to about Mt. Sel??? where the Clearwater River is, where we worked. And all the rapids were still of course, rapids, not covered by the waters of Lake Williston. So each of the rapids became a challenge to get up by.

#105 SB: So you were collecting samples?

CS: We were collecting palaeontology samples, strictly for stratigraphic calibration, that was all it was.

SB: Had there been much work done up there before?

CS: Just McLaren himself had been in there, in 1918 I believe it was, when they were surveying the coal originally. He'd collected the fossils and he'd stayed on in the canyon, because it was a lovely fall. Finally they were desperate that he'd been lost in the wilderness because of course, in Ottawa they think anything outside Ottawa is a wilderness. But he just stayed in mapping and did the classic work on the whole of the canyon because they water was so low he could work around in the canyon. So the end of that summer, we used to get paid $75 a month, so that was quite a lot of money in those days, it allowed us to stay alive during the winter. Next year of course, I always came back to the school each winter, whether I was taking courses or not taking courses. I would work up palaeontology and write papers with Dr. Warren, sometimes I took courses, sometimes I didn't, it didn't seem to make much difference.

SB: Had you enrolled in a graduate program?

CS: Yes, I was enrolled theoretically, in a Masters program but if a job came you walked away on the job, you didn't worry about that aspect. So finally I did, the following year after McLaren, that would be 1938, I went up to Yellowknife. We mapped a bunch of gold claims north of Yellowknife and up on Gordon Lake. Hugh Fraser, Slim Gamey, those were the prospectors that were associated with.

SB: And why had they decided on that area, was there. . .?

CS: Because in the Depression the only thing that paid off was gold. Because it was currency the moment you got a bit of gold. That was the first time I met Pete Shwert???, the. . .

SB: So you were hired by these prospectors or. . .?

CS: I was hired by the mining company, and my boss was Hugh Fraser. So we mapped all summer long. We went in in April and we came out in late October. From ice to ice.

SB: Did you make any big discoveries?

CS: We never made any big discoveries, found lots of gold and they opened up a few of the claims. The one claim on Gordon Lake we blew out a bunch of beautiful show gold and I have seen it in every promotional effort on down through the years and I always tell the guy, don't tell me that came off your claim, I know where it came from. It got spread around, it was lovely show gold. We did find a couple of good veins but not enough, at $35 an ounce, to really warrant development. Came out of there and came back of course, to school again. Then I went the following year, I went to work for [Bennerman and Trees]??? Oil Company in the Pouce Coupee area. A syndicate up there of farmers, Bob Cochrane, who finally became wheat champion but also held oats championships and clover championships and grass championships, world championships, was one of the

members. Lee Alward, another farmer of the Peace River country, was part of the syndicate.

#168 SB: And what had made them choose the Peace River area?

CS: The reason of course, the syndicate was trying to develop the Peace River area for their gas. It was very, very expensive, gasoline and oil up in the Peace River country and they felt if they could find some it would drop the price. And Imperial Oil had drilled an old gas well on seepage on the Pouce Coupee River and for years intermittently somebody would open up the valve and light the flare, so it had quite a reputation. It impressed everybody very much. Well, having this remembrance of the flare up in that region, they chose the site near the flare but on the upland rather than in the bottom of the valley and they drilled it. They ran out of money so Bennerman and Trees came along with extra money to drill it on down. They brought up a tool push from the States, Arkansas.

SB: Do you remember his name?

CS: Bob Story, they brought him up. And they brought up L. G. Huntley who had done geological work in the Mexican revolution. He used to eat breakfast and eat lunch with the revolutionaries and then back to the government side for the evening meal. He was kind of recognized as. . .he'd also done work in South America, he was the geologist for Bennerman and Trees, I was the well site, I sat on the well. Rather an interesting well. It was an FK-Sullivan core drill that they used, and the old driller, John Lund, had been one of the ones that had gone to Russia in the old exchange in the late 20's, when Russia borrowed technical help from America and all over the world in order to get theirs started. In the days when, if you were in trouble in the well and you happened to be Russian, you were liable to be shot for sabotage but if you were American, you weren't shot for sabotage, you were just deported. He was an old cable tool man and then he'd gone diamond drilling in the Slocan. Then this cable tool business had taken him over to Russia on this exchange of technical help. Over there he met his wife and brought her back and she's still alive. Because later on when this same syndicate made the discovery of St. John, he was able to buy the hotel in Pouce Coupee and Lund finally ran the Pouce Coupee Hotel.

SB: What about the syndicate of farmers, who had done their drilling?

CS: This was the same. Lund stayed on with it, no matter who was doing it. He became sort of part of it. So what we did do at Pouce Coupee was, we did discover that the Triassic was under the plains and was porous and was partially oil bearing, although not enough to make it commercial but there was enough, it came from below the gypsum and within the gypsum series, from what would be now, the Boundary Lake sand position, to when they'd shut in the well and they'd done capping it, they could bail out enough oil to run a tractor, it was quite light coloured oil. So at that time the well was out by Bonanza. Bonanza at that time consisted of a store and I don't know whether it's any bigger now or whether it even exists. Anyway, it was just up on the upland whereas the old Imperial well had been down in the valley. Then the following year I went up on the Pine River #1 well. To get in there in the early spring we had to go in and across on the old basket ferries because the ice was still clogging the river to some degree and it was pretty rough,

so we went across on basket ferries and then used horses to go into the well site. Then they dragged in the machinery and got the old Pine River #1 well. Now this was the first attempts of a government to go it alone and run their own project. And of course, as the Saskatchewan government has found out and Petro Canada is finding out, you've got to put out some money if you're going to take any money in. This was the first lesson that B.C. had had on this but it was war time and T. B. Williams was brought in as engineer on the well. His brother, M. Y. Williams was the geologist that located the well. The first day I was there I went out, up the hill and into the canyon and found a bunch of marine fossils. We realized then that we had a much deeper target then to go for than had been realized as the beds were marine and not continental as had been supposed at the surface. So we had a long way to go. The first thing we found out was there was a 1,000' of unconsolidated lake glaze in the valley. We didn't have enough casing and to bring casing in over those mud roads was almost impossible. We had a hard time getting the extra casing in order to case off these 1,000' of unconsolidated clays. Then the well had been, because of the mistaken horizon of starting, the well was located too far east. It should have been moved but because the government was a government and they had ordained it to be drilled, there was no way you could stop it. We were down to the place we were drilling bowhead rocks and we were making a foot a day, which is not very good, a couple of feet a day. Anyway, we kept on, 2 ½ years, with a fishing job in there that took almost 3/4 of a year to resolve, got stuck in the hole. While we were stuck in the hole I went down and investigated the seepage down in the Monkman Pass area that had been reported. Found the seepage and the gas flare and we lit the flare and then had a hard time getting it out. I went in with a little pack string rented out of Elmworth. Elmworth now of course, is the big gas field but at that time it was nothing but the place we got the horses. Having gone in and mapped that then I had a lot of time and it was a rather nice summer so I did the stratigraphy, more or less up and down the valley, all the way from East Pine to Pine Pass. Mostly on foot, occasionally with a lead horse with a pack on it. The Survey was called in, once we realized that they had mistaken the horizons, as assistants, and Wickendon and Shaw came up at that time and I got to know them and became lifelong friends with them.

#310 SB: Did you use many of the original survey maps from some of the earlier surveys that had gone through?

CS: There were no earlier surveys.

SB: Not geological?

CS: No, no earlier surveys.

SB: How about the seepages, were they. . .?

CS: The seepages, we had to go and find them, we didn't know where they were, they were just rumoured to be in there, the trappers had seen them. The way I ran it down in Monkman Pass was they said, we know they're over there somewhere and when I crossed the crest of an anticline I said, we'll just walk down the crest of the anticline, that's the logical place. And we just walked right down the crest of the anticline and there was the seepage. So it was rather easy. In those days the country had been burnt off and sitting on

a horse you could see all over. Last time I was in there you couldn't have found the seepage from the anticline, you couldn't see anything at all, it was all forest. So having wasted part of my life there, I came out during the winter for 4 months and wrote my Master's thesis. Each winter we were out for a time because you couldn't operate in the extreme cold weather. You see, all these were, at Pouce Coupee we used wood for the boilers and at Commotion Creek we used wood for the boilers. Finally you just couldn't catch up in the winter, with all this steam around, it just couldn't operate. So in the middle of winter we always came back to the university here, spent awhile and worked up some fossils.

End of tape.

Tape 1 Side 2

CS: In those days Imperial Oil consisted of one permanent geologist, Ted Link, period. It's hard to look back on those days but then when they were doing this extra work for other companies they hired students and Joe ???, he never left Imperial actually, he just went all the way through to retirement. That temporary job was followed by another temporary job, and another temporary job and of course, finally, he was just taken in to the organization. But as I say, Joe was the first man that I knew that ever got a permanent appointment just after getting out of school. All the rest of us worked temporary jobs. And I worked for 2 ½ years for the B.C. government up at Commotion Creek and I was never other than on temporary occasion staff. There was no pensions, no benefits, no days off. So we worked 7 days a week, were on duty 24 hours a day.

SB: Was that a survey as well or. . .

CS: No, it was sitting on the well at Commotion Creek. I was on temporary, occasional staff for 2 ½ years. Following that, of course, I would go back occasionally and the syndicate was still wangling the Pouce Coupee well down, then they finally reached the Paleozoic. But I went over and logged the well then, from Commotion Creek, I came out and went over to Pouce Coupee and logged the well for them.

SB: Did you ever hear of any interest by Imperial for going back up into that area at that time?

CS: No, they were not. . .although, had there been a real discovery of course, they were ready to go. You see, in those days the Conservation Board consisted of 1 man only. So he visited every well that was drilling or testing. It was kind of a funny set of years.

#043 SB: Who was that at that time for the Conservation Board?

CS: It's a little difficult for me to remember now what they called him, I'd have to look up and see what the designation of the Conservation Board was. I don't think the Conservation Board was put in till about '38.

SB: Yes, well, there was Alberta Gas. . .

CS: Yes, you'd have to look up the original title. At the moment. . .but whoever was it, was it. It wasn't a matter of one of the henchmen came out. You see Mary Turner took a job in about there herself. With the Conservation Board.

SB: Where had she originated?

CS: Here, ???. So I know that somewhere there was a formulation of a proper Conservation Board because Doug Layer himself went with the Conservation Board, but this would be after. . . Reg Goodall was the. . .but then I don't know where Reg's position was then. I think he was just with the department of resources or something like that, or lands.

SB: Bill Cannode, was he. . .?

CS: He wasn't until later. You see, Cannode, that's a little later somewhere. Because you see, it was after the commission that Aberhart put in to see if he couldn't make money. . .you remember, the commission said, forget it you'll make more money if you stay out of the business. And of course, that's the thing that Trudeau later on didn't do, he didn't send a commission to see if he could make more in or out of the business. So anyway, you always met the officer, that was really it and I think Reg Goodall was there even, yes, he was there at the original testings. But I don't think he was Conservation Board at the time, I think he was Department of Mines and Resources or something. I don't think the Board . . . but you could check that

SB: With your thesis topic, how did you decide on that?

CS: Well, I just wrote it on the Pouce Coupee area. And I'd done a lot of collecting a lot of fossils and this became sort of part of the deal. We used the Pouce Coupee well as for depth and then I mapped the surface pretty well all over. Following that of course, it was war time. I'd got a deferment, I was registered at Little Prairie, which is now Chetwynd, I was there for wartime registration. When they were finally through I came out to the university and I had about 10 days to go to Camrose to be inducted, I had my call-up notice. I was over at the university and in walked a man from U.S. Army Pentagon, he was a civilian. He was talking to Dr. Allen about geological prospects and he was interested in the building of the Alaska Highway and the airport at St. John and the staging routes generally and what you could do, perhaps to get some fuel in there. So Allen said there was coal up in the canyon of the Peace, well, what about oil and gas. I was in the outer room doing some geology or something or some palaeontology and he said, well, why don't you talk to Stelck here because he's been up in that country. So I went to work as a civilian attache, to a civilian, to the U.S. Army Engineers. Then I was transferred from that, I got my deferment, because that evening the civilian was sitting next to the man that was in charge of manpower at that time. He said, this is kind of stupid sending over this guy so I got a phone call the next day saying that I had been deferred to take the job with the Canol. Now I started out with the U.S. Army Engineers, at the old Redwood building, although I worked here at the university. And I was transferred from the U.S. Army Engineers to the U.S.E.D. And I was transferred from the U.S.E.D. to the U.S.E.D. Canol.

#110 SB: Does E. D. stands for. . .?

CS: United States Engineering Department. I was transferred from the U.S.E.D. Canol to Imperial Canol and I was transferred from Imperial Canol to Imperial Oil and that's how starting to work for the Pentagon, you wound up working for Imperial Oil and it was nothing but transfers all the way.

SB: And were they all in the same office?

CS: Oh, I was doing the same type of work. I mean, I never changed the type work until I got to Imperial. It was just that they'd shift.

SB: Responsibilities. . .

CS: Well, yes, as the challenge of building the Alaska Highway, the pipeline and everything became bigger, then you'd be transferred to the proper division you belonged in.

SB: So what was your specific duty?

CS: Oh, I was a geologist and palaeontologist. I did the 50,000 fossils, I identified 50,000 fossils of the Canol project. I'm not saying they were high class identifications but they were done in a hurry, fast enough so all the men could develop their maps and make their correlations. So while we were up there on the Canol project, and then of course, I went from here to Chicago to photograph the fossils that Ted Link had picked up in the 1920's when he discovered Norman Wells oilfield. So I photographed them and then came back and then went north, in the snow. Went out by dog team into the Franklin Mountains and as soon as the snow started to melt we started mapping, sent the dog teams back and we started mapping and then walked out. Then we had various expeditions out from Norman Wells itself. On that group of course, there were a lot of the graduates from the University of Alberta were with us, or students from the University of Alberta, naturally.

SB: How did they decide on Norman Wells for the site for supplying the Canol project?

CS: The thing was that they decided to build a pipeline across the Mackenzie Mountains to supply the refineries on the Alaska Highway and Norman Wells was the closest. And of course, Norman Wells was already developed as an oilfield to supply the Mackenzie anyway. And the big thing about it was, it was sweet oil, so it could be used for making airplane fuel right away. You didn't need a complex refinery to handle it, that was the big thing.

SB: Did you come across any other evidence of deposits or reserves during. . .?

CS: That is the funny thing, we were never able to pick up another oilfield in that region. Although there were places where new opportunities. . . I mapped on the Peal River, north Yukon and finally they did bring in a chance well, 20 years later, in north Yukon. But basically, it was a freak well, it's still a freak well in there. It's a corral reef well. That was the first time I met Desmond Boggs and Des Boggs had come up from South America and was familiar with reefs. He was the first man to positively identify reefs in Canada. My first job when I went north, for the Canol project, not when I was down here but when I was north on the Canol project for Imperial was to see if this crazy man Boggs, knew what he was talking about. And of course, I went out and I found the reefs and yes, had to agree, Des Boggs was right. Before that they thought it was an anticline. Suddenly we had converts that were poo-pooing this reefs in the Arctic business, we had converts among those that had most strenuously opposed it. Of course, the <u>experts</u> came about finally, from those that had been the Doubting Thomas's and it was rather interesting. But that was my first job, to determine whether Des Boggs was right or not.

#172 SB: And Norman Wells was a reef?

CS: Norman Wells is a reef and was the first one that was identified as a reef in western Canada. This stood Imperial Oil in good stead because in Imperial Oil we thought reef

and an awful lot of the men that had been connected with the Canol project thought in terms of reef, even though we didn't think of them down here at first. You see, later on Doug Layer recognized the reefal material at the old Victorian settlement well and, Bruderheim well I guess it was, and that's why we went looking for the reefs that resulted in Leduc being discovered. So Des Boggs and Doug Layer to the discovery at Leduc is 1, 2, 3 step. They're brilliant men, both of them.

SB: What about, when you were working on the Canol project, were you actually located in the camp there?

CS: No, I was very seldom in the camp, except at the finish when I was doing the fossils, identifying the fossils for all the parties. 13 parties or something like that. My own party was Johnnie Carr, who later discovered Home Oil, the Swan Hills and the Virginia Hills fields, first led them over to the North Sea. So Johnnie Carr was one of my party. Elmer Umbaugh was another of my party. He was a U.S. Army personnel and here he was working for a Canadian civilian and that rankled some of the American officers very much. So it finally made it into the hassles down in the U.S. Senate or someplace like that. However by the time they got hassling about it, it was all over with anyway. But we were kind of mixed up, U.S. Army personnel and U.S. civilians and Canadian civilians, all mixed up together on these parties, they were all geologist. They'd either been seconded to it or deferred to be allowed to go on it.

SB: What about travelling on the Alaska Highway?

CS: You couldn't go up the Alaska Highway, they were still building it at that time. It wasn't completed until a little later. All supplies were taken in via the Athabasca, Mackenzie, Great Slave route. They were all barged in originally.

SB: Who were some of the other Party Chiefs?

CS: Freddie McKinnon. Keith Huff was on that who became Vice-President of Exxon in New York. Parker was on that, John Parker, an American who became head of the AAPG. About, I think, 2 years ago he was head of the AAPG. Sluzer was on there, Ian Crawford was on there, with Shell Oil there. Ivan Six that became a, he was a reservoir engineer for Shell and now is working in Indonesia. I think there were 20 of us or something.

#228 SB: So for a lot of Canadian geologists that was probably their start in the field was it?

CS: Yes, a lot of them got a good start in that. The Canol project was sort of a funny thing. I was the last I think, Canol geologist because I was flying north to start the next season's work and they shut down the whole Canol project. They couldn't get rid of me until I got back to Edmonton because that was my base. So I left Edmonton here a Canol geologist and I got to Norman Wells and there was no Canol project left and I got back on the. . .I had a week's worth to do up there with fossils and turned around and came back. We'd shipped a lot of the fossils to Dr. Warren. Out of that, Dr. Warren and I had put out the first special paper of the Geological Association of Canada on the fossils of the Devonian from those collections.

SB: Did they learn much more about identifying any of the formations?

CS: Yes, there's an awful lot of good information came out of the Canol project and it was finally published by Hume and Link, as the Geological Survey of Canada memoir. So it

wasn't lost and the palaeontology has been worked up pretty well in various ways over the years. Once that folded of course, there was no more work in the Arctic for quite awhile and we came back with Imperial Oil to work in Alberta and northeastern B.C. My first work was with the old Northern Foothills Agreement, my first field work. That was really something to try and work for the Northern Foothills Agreement because so help me, no man can work for 5 masters. That's about what it boils down to.

SB: And that was, was it the McMahon's that were involved in that?

CS: No. The Northern Foothills Agreement was Imperial, Shell, BA or Gulf, I can't remember just which one there. And they'd agreed to share everything, it was a good idea. But I'd hired a pack string from the Beaton's up on Beaton River and they'd trucked it down there and I no sooner got them all trucked and ready to go than they said, they decided to give the easier one to Toppelay??? because he can get in there, we'd like you to find another pack string and go down into the area south of the Wapiti. So at the high water mark I was swimming the horses across the Wapiti River, heading south. Kind of scary, we found an old boat there and covered it with canvas from the packhorses and nailed 2 canvases on the outside and went across with the pack boxes and then swam the horses across. When we got to the other side the packer said to me, it's right there where we found the 2 bodies of the packers last year that were drowned. So that made you feel kind of good you were on the other side of the river anyway. The first year I just mapped for Imperial out of Entrance, and we went all the way through from Entrance to Beaver Lodge and then turned around and came back. We had 29 horses out of Edson. I never got any real love for horses, in spite of having worn out many pairs of shoes on that trip on the horses.

#302 SB: Who were some of the people in your party?

CS: I had Ivan Six with me, he'd been with me in the Arctic and he came with me. We were the party. Then we had the packers, one of the Mulberry's, Ed Mulberry was one of the packers of the Mulberry group. He was the best man with a horse I ever saw, he could walk up to the wildest horse and talk to it and pretty soon he was putting pack saddles on it. We mapped all that country in there including the Sherman Flats area. A lot of the coal is now being looked at by the B.C. developments worked up through there. And I worked in the foothills there for 3 years for Imperial Oil, although it was under NFA. That was a beautiful life. It was before the helicopter and when you pulled the trail in after you, nobody bothered you and you were able to do your work. Of course, nowadays, the big bosses come out in the helicopters and bedevil you but in those days nobody bothered you much. Once you were 50 miles in the bush, forget about it, you never saw anybody. We mapped all that area there between, actually, Hinton and the Wapiti River, over the years. Then I decided to go back to Stanford.

End of tape.

Tape 2 Side 1

SB: . . .like what your impressions were of the whole operation, it's effectiveness.

CS: The Canol project, now from the inside, I'd been up in British Columbia on the Pine well when I first ran into the members of the Canol project, that's the highway portion of it. I was converted to the American way of doing things, you do the bloody job, that was the whole idea. You didn't argue whether it could be done or couldn't be done, you didn't sit around and debate on it. If the job was to be done you went ahead and you did it. And there was a lot of lean, mean men that never slept. They were sort of expediters and they would run up and down that road. A man needed a truck 4 stations up, it was his business to get it to him and he got it to him if he had to steal the blessed thing and get it up there, practically carry it himself. They were a rare breed of men but I got to admire them. There was one thing they had on their minds, the job to be done and they never let that go. People talk about waste, but somehow they had risen above that. If it took 2 loads of gravel to fill the hole they put them in, they didn't argue whether you might get by with 1½. That was the first time I realized why America as such, was able to get things done because the job was more important than debate on how it should be done. This was a great lesson I learned. As for the highway, the Minister of Mines in B.C. said it could never be built, the Deputy Minister, John Walker. I said, you haven't seen those men, they'll put it through the muskeg. But sitting out there, it was a political debate in Victoria, could you really build a road through muskeg. The men on the job didn't ever look at it that way, they said, we're building a road through the musket and they opened quarries in the bedrock and they through in bedrock until they had a solid foundation and you can still ride on those roads. They're good. Now I saw them do that and I had a great deal of admiration for the way they approached the job. As for the pipeline itself, it cost less than a battleship and you couldn't sink it so it was safer than tankers and everything else. Although we did have, the first time I ever heard of Harry Truman was, he sent up a commission known as the Truman Commission to investigate the way we might be wasting money at Norman Wells and when he got through he couldn't see where they weren't getting full value. But at the same time, that was the first time I ran into the Truman Commission, or the word Truman, I didn't know who he was before. I didn't meet him of course. I did meet R.C. Moore who was the representative of the Truman Commission. R. C. Moore was the great textbook writer and geologist so I was kind of thrilled and I got to be good friends with him. But out of that sort of enthusiasm of the Canol project, I guess that's why the enthusiasm started in Alberta for looking for oil. And then of course, the discovery then of Leduc, simply because Doug Layer recognized reef cuttings. And before of course, anyone else realized what we were doing we had not only Leduc but we had Redwater as well and a bunch of other fields.

#046 SB: Just going back to the Northern Foothills Agreement, who was the geologist in charge of all the field parties?

CS: Well, I suppose Link would have been. No, Jack Webb by that time. Link was. . .Jack Webb was in charge when. . .you see, Link had an open door policy, he never shut his

door. It didn't matter whether you were top man, bottom man, it didn't matter where you were. . .it would be Link I guess at the start. . .it's a little hard to say. I guess to put the right perspective on it, I'd have to go back and check the actual dates. But Link on the Canol project always had an open door policy and his office, you walked in and the first thing he said, what the hell do you want. I asked him one time why he talked that way and he said, well, it allows the person right then, if they're mad at you or they have some beef, you find out immediately what is really wrong and they don't sit out and try to revamp their stories. He said, so what, they've got a right to be. He was a tremendous man that way, what the hell do you want was the question and they guy would blurt out, I think you're treating me wrong or whatever, fine it was all settled right then and there. And Jack Webb also had an open door policy. You didn't have to have an appointment. So the story of the discovery at Normanville is a very good one. George Fokatis??? down in the basement in the ??? well and he suddenly realized that it's deep water. By this time we'd drilled the Spirit River well and we knew there was an island over there. He comes racing up the stairs and says, Jack, Jack, it's deep water here, shallow water there, it's got to be a reef. Jack stepped to the door and called McKinnon and myself and the rest, come in here, what do you think. It sure looks right, so he reaches for the telephone, calls the seismic man up and says, move your crew over across the river to this side of the river. So they moved across, ran a line across, picked up Normanville and drilled a well. And I don't think there was notes. You see, it wasn't lost on the way.

SB: If it had had to go through all the different levels. . .

CS: If ??? said, make a proper report in triplicate or anything else they would have died. The initial enthusiasm, the initial vision was never stopped.

SB: So you decided to go to Stanford you were saying.

CS: Yes, along about there. So we'd been in on the original discussions about where to locate, go looking for the reef, once Doug Layer had said there was reefal material. You can read that up in Doug Layer's history of the Leduc field. But we all agreed we should go west and that gave us the. . . but by that time I'd already been teaching here, in '46 I was up here teaching. I used to commute between here and Calgary. I'd teach so many days a week here and then go down to Calgary. So I was paid half by Imperial and half by the university. They had the veterans by that time and they wondered what to do and they couldn't get anybody, I was commuting. Of course, by this time they'd opened the border again. You couldn't get down across the border.

#094 SB: During the war?

CS: During the war. If you hadn't already started school you couldn't go on. So what I was doing was, and then they opened the border and as soon as they opened the border, that was about '46 then I went down to Stanford. I was only down there. . .well, I'd come back in the summer and I worked for Imperial Oil in Calgary. Then I went down to Stanford and I'd just been down there a little while and Dr. Warren took sick. They said, if I'd come back, I didn't have to worry about my degree, whether I had it or not, if I was willing to come back. So I was down in Stanford 18 months then I came back here and finished off my thesis up here. It was on the microfossils of the Fort St. John area, and

there's some of them right there, in that sack. So I was studying under Cy Mullard down in the States and under Myra Keen, the famous ???ologist. But I wasn't there very long, just 18 months. So I had to come back and finish, well as soon as I got back, I was back about 3 weeks and Dr. Warren was taken off to the hospital to be operated on. So I was teaching his courses and my own.

SB: So you more or less took over Dr. Warren's position?

CS: Well, I had to fill in. Follensby was appointed here in '46, I was teaching here in the spring of '46 and he was appointed in the fall of '46. He was here and so there was a couple of. . .the veterans were back and that's who I'd been teaching. So when I came back I was dealing with veterans, most of them the same age as I was. We had such good students as Bruce Bullock and that became Bullock Helicopters. And Arnie Nielsen of course. So I had some pretty good kids, Willy Norris, Fred Trollop. I had some kind of nice students if you want to put it that way. They all went on to be very successful.

SB: You became. . .I guess the size of the classes really expanded with the veterans.

CS: Yes. With the veterans we. . .you see, you couldn't flunk a veteran. You could tell him to repeat a course but you couldn't throw him out, so it meant that the students had a time to get back and they had a pretty good time, there was a good spirit in those days. So we had larger classes. Then of course, we started expanding the courses, we introduced micro-palaeontology and Dr. Warren started working up ground water and got a palynologist??? we started the research council going again. So we were, I'd say, quite busy in those years. Then in '51 Rutherford died unexpectedly. I used to come here in the morning and I'd lecture, start labs and I never had dinner and at 4:00 I'd finally, 4:30 I'd sit down for a few minutes. Then you'd work all night to get ready for the next day. But at the same time I was consulting at that time. I went working for Pacific Pete and used one of my students, Sam Bahan, he was working for Pacific Pete properly. So I consulted with him but it made a very close relationship. We mapped then the St. John area, the St. John field. We were very successful in outlining the St. John field. Of course, we had already done all this micro-palaeontology for Imperial Oil. So I had a pretty good idea of the strata succession there. So what we did is we mapped the whole St. John area on fossils, because the seismic wouldn't work across the buried channels of the Peace River. See, the channels go 1,000' down and yet on the surface they're covered up as though there was nothing there. So you couldn't use seismic very well so we mapped the St. John field on fossils. The syndicate had originally taken out the leases but they were sort of farmed out if you want to think of it that way, to Pacific Pete. Then Pacific Pete hired us to map it for them. The syndicate has. . . they finally turned into a public company a couple of years ago in order to. . .

#171 SB: What did they call it?

CS: Just the Allward??? Syndicate. It went under various names, depending on. . . It was called the Wilson Syndicate for when they drilled in St. John but it was all the same people.

SB: So I guess the McMahon's hadn't recognized the presence of gas in that area?

CS: No, the thing is the McMahon's then came in. . .when they released it from being under

the federal government. In other words it was sort of a federal government reserve and when it turned back to B.C. then it was taken out and everything was put up for grabs. I'd originally outlined the St. John field in an old map for the Canol people on the highway and contoured it back there so they knew the . . .I guess there was some record of that. So that's why they came up there anyway. Anyway they came up and it was. . . first was an oil well but they never produced it, the discovery well, #4 brought in the big gas wells. Then because of the gas field, they had hearings to decide whether the pipeline could be built and the West Coast Transmission of course, came on that and that's where McMahon's money came from. Because he held an interest in West Coast but he never made any money on the Pacific Pete side of it because when he worked out how much we were supposed to get for gas at the wellhead it was 3 cents, which was hardly enough to pay the expenses. So of course, Phillips bought out Pacific Pete.

SB: There was an early refinery up in Dawson Creek for awhile too wasn't there? It seems to me, Excel Refinery or. . .

CS: I'm not sure of that status of that one, you'd have to run that down through somebody else. I don't remember it personally. But then of course, they built the refinery and scrubbing plant at Taylor Flats.

SB: So almost any developments that were taking place in the Peace River area, you were involved with them?

CS: Yes, very much so. And then you see, I went with Canada Southern when they went up in there. After St. John was discovered, everybody was interested in it and I went up and was a consultant and I mapped ground for Canada Southern and for various people. I've got several thousand pages of reports that I wrote at that time.

#216 SB: Had you made any representation at the hearings for West Coast?

CS: No. I was at the hearings of the original decision to build the oil pipeline to the east, when they brought up A. I. Levison, to decide on whether there was enough oil to justify the pipeline. Of course, I studied under Levison. I was in on those and then of course, I did represent the northeastern B.C. and the northern foothills geologically in these hearings. But I was not on the West Coast and that's when I found that it didn't really matter. Oil, gas would be decided by politicians after it was found. They become sudden immediate experts in that way and it's finally money then. It's no longer got anything to do with whether the rocks or the amount of gas or anything else, it's just what the law and taxes and the financing and the interest rates, that governs whether a thing is viable or not. It's got nothing to do with whether there's oil or gas there finally. So we took a fair amount of money out of it. But of course, the shares became worthless because we'd made the discovery.

SB: When Imperial made the discovery well up in the Fort St. John area. . .

CS: That was Pacific Pete.

SB: Oh, Pacific, that was the very first one? Was it. . .?

CS: That's the first gas in British Columbia.

SB: Was it much of a surprise, did it . . .

CS: Oh, it really created quite a stir. But as I say, I'd worked it out originally because I'd seen,

when I was with McLaren, I'd noticed that time that it was flat. When I was lying on my back at Commotion Creek I could suddenly see the reversal taking place because I'd gone out in the field and measured the thicknesses and the thicknesses were too great. And if the thicknesses were too great from what I knew they were at Peace River, where they outcropped again, then there must be a big wedge. I just placed the wedge mentally over the flat stuff and I could see it would reverse in the opposite direction. So that's why I kine of. . . But then I didn't get around to . . .the syndicate took out the acreage because I told them about it. I said, if it ever comes loose, take up this ground. Well, years went by and then it came loose and they took up the ground and then Pacific Pete farmed it out.

SB: So Pacific Pete beat them to it in a sense?

CS: Pacific Pete was quite happy to pay us a royalty. The trouble was the royalty ultimately didn't exist because it was net and the 3 cents or something, there was nothing left over. Anyway it was good years. In those years the students were without jobs. There was one of those recessions. Just after the burst of Leduc then everybody kind of pulled back a little. There were no jobs so I took pretty well all the graduating students out. I took 12 of them with me and hired out to Pacific Pete to map the area. So those kids had a good. . .

#275 SB: Was John Anderchuk one of those students?

CS: No, Anderchuk wasn't on that one, he was on the ??? as far as I remember. I can't differentiate between the summer and the winter with the students in the class.

SB: And being out in the field.

CS: No, Anderchuk graduated before that. He was one of my first graduates, one of the first Master's students that came through. So that was the next batch of boys I had.

SB: By that time, geology, with the discovery of Leduc I guess a lot of people. . .

CS: Yes, it was really going by then but you see, it was one of those sort of recessions for geologists. So no work, I just took the contract, took the whole works out and I did that for 2 years. But then after that of course, the jobs then picked up again. You know, you develop these plateaus. You're short of engineers if you discover too much oil, you're not short of geologists at that point, you're short of engineers to process the stuff. Then when it's turned into cash, that's when there's no shortage of lawyers or anything else.

SB: Lawyers and accountants.

CS: Yes. So I mapped then, back in the Peace River country for Canada Southern then as well. Mel Reasoner hired me as a consultant.

SB: What attracted them to that area, just. . .?

CS: Well, the gas and the oil. And they held land. Once St. John was discovered, of course, there was tie-in acreage all the way north and all the way south you see. And then Les Clark, who was with Pacific Pete, made the statement there was no oil or gas south of the Peace River. Because that's where Elmworth used to be. And I mean, there's 100 fields in there now. But he made that statement and he blocked off entirely any development there for many years.

SB: And everybody respected his opinion?

CS: He was highly respected and justifiably so. It's no different than the time the expert came up from Carter for Imperial Oil and said there couldn't be any oil south of Leduc because

that was a hinge line. And of course, Wizard Lake, Rimbey. . . Experts should not make broad statements, I think, that's all.

End of tape.

Tape 2 Side 2

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Tape 3 Side 1

SB: It's September 13th, 1984, this is the second interview with Dr. Charles Stelck. You were just mentioning that the work of the Geological Survey was very fundamental to going into remote areas and kind of knowing what had been found there before. Would you like to elaborate on that a bit?

CS: Well, I had the privilege of following, often being the second person in after the Survey had been there, as far as publications were concerned. And I found that the early officers of the Survey had a very meticulous record of what they had done. When I was coming down the Peale River in the north Yukon, we used Campso's??? original recording in his traverse as our bible. Every morning we got up, we read what was around the next corner. He not only told what would be there geologically but would also tell you of the hazards, the rapids and the general contour of the country. So for that reason our first action was to get out the little book which we kept in plastic, very carefully wrapped up so it wouldn't get wet in the canoes. That was opened up and we saw what was coming up the next day. This was true when I was working on the Mackenzie, the work of Hume and the work of M. Y. Williams, we could always be assured that the way it was recorded would be the way we found it. Of course, the great explorer McConnell, one of the outstanding explorers of all time. He even described how he remade the canoes and the boats when he had to saw them up in order to get over the rapids. So these men were in real essence, officers of the Survey. Even as late as the 30's, these quasi-military arrangement was still with us, so L. S. Russell used to run up the Survey flag in the morning and haul it down in the evening in somewhat, I can't quite call it military but it was based on an officer discipline relationship. So that we did it that way because that was an effective way of keeping discipline, keeping restrictions on when we got up and when we went to bed so that the isolation of the bush didn't keep you getting sloppy, or bushed I guess is the word. Now McLaren had a little of this idea too. You got up in the morning and you were out at regular times. So that you got the work done and you did a certain amount of work and when evening came you did mark it off. Now this was the difference between the Survey a little, and the oil company. The Survey did tend to have regular hours, which was a very helpful thing whereas working for the oil companies, we never knew when we'd get

#044 back to camp because it was a little different attitude. The job had become more important I suppose, than the discipline. Of course, the Survey men were going to do it year after year and they had to have the discipline. Whereas often we were on spot jobs and our job was to get the job done. So when we look back at the Survey, the fundamental work that Whiteaves did in palaeontology, Wickendon in micro-

palaeontology and McLaren did in his Mesozoic palaeontology, especially in the west here, laid the foundation on the dating of the stratigraphy of western Canada. Now on top of this came the peculiar addition, I say peculiar because it was almost unique in the way, Warren Rutherford and Allen of the University of Alberta, somehow became almost a sub-office of continuing what the Geological Survey of Canada was attempting to do on the large scale, they said we'll try and do it for Alberta. And they followed much the same patterns and indeed, much of Warren's old notebooks are Geological Survey of Canada notebooks and both Rutherford and Allen in their day had worked for the Geological Survey of Canada. And there was no difference between the way they tried to approach the subject. The first job was to map Canada, in their case, map Alberta. This led of course, to the foundation of the Research Council of Alberta, Dr. Allen was a very important member of that original group that got together and founded the Research Council of Alberta. Because of that, the geological portion had always a prominent position. And in the Depression, when they didn't have funds enough to run the Research Council of Alberta then the Research Council of Alberta was in large member, half a secretary in the geology department of the university. This allowed the Research Council of Alberta to exist during the late Depression and indeed, during the early war years, until we got the post-war and that grace came for the Research Council and really started to reconstruct it in a proper fashion and finally brought in Con Gravener??? as head of the geological division of it. Before Con Gravener took that position we had already, in the department, started to bring out the publications for the Research Council to reestablish it as a viable wing of exploration and investigation of western Canada. So we always had a very close relationship, as a department, with the Research Council of Alberta. It was born and brought up and nurtured during the Depression years in our department and Rutherford laid down the first ??? in your plains maps, the marginal foothills maps for Alberta. So in that measure they also laid a foundation in Alberta, first the Survey man and the Research Council of Alberta was really the second group that came in. There were other men in the Survey but in western Canada the pioneers form a separate group. Then it was the members of the department of geology for a few years. The nature of the man, Dr. McLaren in the Survey, was such that when Collins took over the Survey during the Depression, he had of course, no use for palaeontology and many of McLaren's palaeontological publications through those years

#097 were by his own expense. He paid to have them published at his own expense and many of them came out in the . . .what do you call that thing, Canadian Naturalist???, at his own expense. Now when the oil group started to get together, Dr. Allen had also been a founder of what is now the Canadian Society of Petroleum Geologists and it was the reason they founded it in Edmonton. But after Turner Valley was found of course, a little more weight went to Calgary and finally, let's say the main operations were conducted out of Calgary in the Alberta Society and then finally the Canadian Society of Petroleum Geologists. But Dr. Allen was one of the founders of it as well. Even though he was known as Hard Rock Allen, as long as it was for Alberta, he was always supportive of anything that was for Alberta. Now Dr. Allen then, also of course, was a founder of the Professional Engineers of Alberta. That's why peculiarly, among all states and provinces,

we happen to be the first ones to initiate registration of geologists under the professional engineering act. That has held today and in large measure it is the envy of geologists from other states and other countries, that we have this arrangement with the engineers to be registered as professionals in the proper way. This has led to a fraternity between the engineers and the geologists so that originally, in the university it was the mining and geology society. If a person was a miner the geologist would know and vice versa. So we had a very close liaison with both the oil fraternity and with the mining fraternity, as a department right from the start. Once again, because of the attitude of Dr. Allen, that there was no difference between academic and practical, what was practical tomorrow might have been academic yesterday, so basically there was no difference.

SB: I guess now there's sort of a controversy over the role of the geologists belonging to the CSPG and. . .

CS: It's APEGGA that they're concerned about. It is usually by people that came here from outside and came here because the money and the jobs were here and the good salaries were here. A few of them came honestly because they wanted to be frontiersman, usually it was the money and the jobs that brought them. The money and the jobs of course, was a direct result of being professionals allied with the engineers so that the geologists were able to rise in the ranks of the companies. They weren't strictly speaking, non-practical. This has been the strength of discovery in western Canada, that theory could become discovery and out of discovery you could build more theory, make more discoveries, so that it's a welding of the practical and the theoretical very much.

#145 SB: Did you find working for both Imperial and in the academic community, that there was a reluctance on the part of say, industry to accept academia or just to accept. .

CS: Not in the 30's and the 40's and the 50's. There was no division. We trained our men to go directly into industry so there was retraining needed or extensive extra training. Not that companies didn't give them extra training but we felt if we kept them broadly educated that they could go right into the industry and this indeed, proved to be the case. They were very well accepted in the industry because we never let them get very far from the practical aspects. Being more or less a frontier community in the academic sense, I guess we knew the job had to be done if we were going to find out anything anyway. And if we could find some resources we could pay our own salaries and that was a very good reason for doing it. No, there was no difference. The men that we sent out from here, take the discovery of Pembina, Arnie Nielsen, Tony Mason, came in one day, they'd been sent up to Edmonton to keep the office clean. Now they were graduates from here, but they'd been sent up to keep the spiders out of the office. Of course, they got thinking a little of the theory and they thought up the idea that the Cardium pinched out and therefore must form a huge trap in the homocline???. They couldn't talk about it to other people but they could talk about it to their old professors. They sauntered in here one day and tried it out on the dog as it were, and they said, what do you think, do you think that's sound. They outlined the whole thing, they said, all we have to do now is find a well that we can have an excuse to drill it for some other reason but we'll look at it. They went out and they drilled a Cardium discovery, which is the largest oilfield in Canada. A lot of people

would say, they were just lucky, no they sat here in this office and outlined their idea and as they outlined it, it turned out. But they had to find another excuse to drill it. When they came to the Cardium of course, the other company that was with them, wouldn't put up their share of the money to test the Cardium sands. However they put up their own money and it's to the credit of Arnie's boss at that time that he went ahead and said, we'll test it. And it was brought in the largest oilfield in western Canada. It's that sort of thinking that came right out of theoretical considerations and then the practical turn of mind that Arnie Nielsen had was enough that, how do we get the hole drilled. If you can't sell the one you sell something else and test it on the way down.

#192 SB: I guess another area is in the increasing use of, well, studying fossils in a formation and using that to find something instead of using seismic alone, you know what I mean.

CS: Yes, well, the thing is the palaeontology for about 25 years, was a dominant tool in discovery. Now the reason for that was that we could get the fossils out of outcrop in the mountains and get an idea what the whole deal was, what the strata looked like. And then we could get it and if we even got a pinch of the same thing with the fossils out under the plains, we could expand our knowledge very rapidly because we had an exact tie across. This of course, was also a tool for mapping in the Arctic where nobody had been. A man gets dumped out on a plane on a little lake and he walks over to the nearest rock outcrop, he wants to know where to start. He gets himself a couple of fossils and if he was properly trained he probably knew about where he was, if he wasn't he got the fossils in to Dr. Warren. Do Warren would give a name on them and he was away on his mapping. Now as time went on of course, and we got more and more of the area generally mapped then the need for the fossils dropped down and that's why about 6 or 7 years ago the oil companies gave all of their collections to the University of Alberta. So we have several million fossils down in the warehouse here that were collected originally by the oil companies and used in the primary designation of the stratigraphy and the primary mapping of the country, on the surface. As well as many of the forms that were used to tie it in to the wells. We have all of Crickney's??? collections, not all of them but a goodly portion of Crickney's collections from the wells here as well. This makes sort of a library now that we have and it's looked after by Dr. Jones, Brian Jones who came in here when we got the collections because that many millions of fossils was just too many for the hired help to handle that was already on staff. And we've been very fortunate in getting him because he's putting it on computer, which wasn't even invented when most of them were collected. However we have tried to save them and it's very important now, very, very important those collections that they be saved because with native rights and parks policies, it's awfully hard to get in a duplicate a lot of those collections today. When we first went into the parks we had a the big old Imperial Oil sign on the side of our truck and when the warden saw us he shook our hand and said, could we go up to the top of the mountain with you today, I'll show you where to get up and he'd unlock the gates and ride up with us. Now it would take 10,000 pieces of paper to get the same privileges, especially if they see Imperial Oil setting in place on the side of your truck. So things

have changed a little. But that fundamental work was done at that time. Of course, the biggest handicap has been the parks policy that's been developed. They even won't let the Survey boys move around very freely anymore inside the park. It's a peculiar thing, from trying to regulate, the easiest way to regulate is to say no. The easiest way to say no is to give some excuse for saying no. And then of course, the heritage for the people is still the best one. So the next thing is then, because the heritage of the people has somehow become sacred, I don't know where man and sacredness became synonymous but the people now have become sacred. And then you get, not only it becomes the sacred mountain, but then it's taboo to go on it and we've gone back to the sort of mystic taboo that is attached on those fossils. There's only several hundred trillion fossils out there in the mountains but right now they've got the category of each one being a sacred entity. But ??? then, at that time, with the parks wardens and everything, we came in as scientists and the fact that we were Imperial Oil or Pacific Pete didn't matter.

#269 SB: And I guess you shared the information as well with other companies?

CS: Oh, the information, this is one thing that I do want to say. There's a lot of vilification of the oil companies for political reasons but in the days when nobody had put up a dollar, they put up their dollar and in the day they say, they weren't publicly responsible. The whole of their information has been made available to the public by volunteer efforts. We have atlases that were made by members of the oil companies, the drafting was supported by the oil companies, time was often assigned to their employees to work on these things and they became public documents. And public documents of such a level that they stand up in a worldwide sense. How much more do you have to do to be conscious of your responsibility. I don't know. As I say, working from the inside, and I worked in the academic side, there was an awful lot of volunteer work went into these things and supported by both the universities and by the companies, in a very real way.

SB: Has that changed now, is there less cooperation do you think?

CS: No, I don't think it is, but the thing is that we've got all these politicians and ecologists and everybody else are harrowing the life out of anybody that does anything. It wasn't done in viciousness. Maybe ecology should be looked at but it wasn't done in the sense of viciousness or even rapaciousness. You drilled a well, you drilled a well. If a little mud spilled into the river, well, so what. It didn't matter that much. Maybe it does matter as time goes on but you can't even find those old well sites if I took you back to them, even those that blew out. That Atlantic well blew out and they farmed perfectly good crops right where all the oil was spilled. Much of this modern oil spilling is overrated by press that, frankly they're too chicken to go into Afghanistan and find out what's happening so it's easier to watch an oil spill in your backyard I guess. That's just my personal opinion.

#319 SB: When you joined Imperial, I guess you found it was sort of a different environment to work in than you had been used to before or. . .?

CS: No, no. You see, what I'm saying is there was no difference between. . . in those days, Dr. Warren's friends, Dr. Allen's friends, Dr. Rutherford's friends, although they did have university friends, their friends were other industry people. So that Dr. Allen knew

all the miners from Yellowknife, he knew all the people connected with the tar sands, he knew all the people connected with the gas business, Stan Slipper. And Warren here, I say in one place in one of these documents, was a Mecca, he was the only palaeontological library west of the Great Lakes, that was viable at all. So all the oil people came through here, either going north or coming south. And all the Survey people came through here going north or coming south.

SB: So there really wasn't, you didn't feel like you'd left. . ?

CS: No, we never. . . and when I went to work for Imperial of course, as I say, I got into it sort of, by a transfer from the Pentagon. Webb, Link, those men were graduates of the surveying part of mapping. And although they went up to be oil company men, they just hung on your every word when you came back from the field to tell them what it was, what you'd found and everything else. They were just one with you. So that it wasn't until later on, you see, until lawyers and bookkeepers came in to run the company that you got that division. But in those days. . .

End of tape.

Tape 3 Side 2

SB: At Imperial, was there a sort of order of command, say Jack Webb was. . .

CS: Jack Webb was the boss and you reported to him but when you came back to report, it wasn't. . .it was his eagerness, what did you find and you're telling him with enthusiasm as another friend. There was none of this make-up a report, 10 copies and the secretary would give you an appointment. He was an open door man in the best sense. So he was glad to see you back and glad to hear what you had to tell.

SB: Where had he come from originally?

CS: Saskatchewan.

SB: And he graduated from there.

CS: From Saskatchewan. Sproule was a graduate of here. One interesting factor that comes to mind in connection with the discovery of Leduc. Leduc was not drilled on an Alberta grant, it was drilled on a Saskatchewan grant. And when the Saskatchewan government kicked. . . I'll put it the other way, made it impossible for Imperial to drill in Saskatchewan they took the money that was voted for Saskatchewan and came over and drilled Leduc wells. With the result, the money on that carried an S symbol, meaning Saskatchewan. Sproule of course, came over with Imperial Oil at that time, from Saskatchewan to come over to. . .

SB: I wonder, would you like to try to go through the sequence of events and I guess the conditions that led up to the discovery of Leduc, from what you know of it?

CS: My own recollections of previous to Leduc was, we had run out of targets basically, that looked really, any good. The Jefferson had been drilled in southern Alberta. Although the Jefferson had produced oil in Montana and had been well thought of, when they came up to Canada the Jefferson was always a disappointment. We had a few little teasers at places like Tilley and Princess, places like that, but when you tried to produce them most

of them went to water very quickly or you couldn't properly produce them, there was always trouble and there was no thickness of pay. Now, our main target was the Mississippian because we had brought in Turner Valley. And Turner Valley in the 30's of course, that is the deep play in Turner Valley then was the target. But then when you got out this far east there is no Mississippian left. So the targets to the east of you were pretty well all Cretaceous. When we went down, if you wanted a lime target you would have to drill deeper and into the Devonian. So they drilled a couple of test wells to see what they could do. When they got this extra money from Saskatchewan they said, where will we drill some more wells. Just before this Doug Layer had recognized the presence of reefal material in the Bruderheim well. That gave us something to look for. The trouble was that
#056 the salt at McMurray had been labelled Silurian because the eastern salt was Silurian. Therefore it was felt that this salt was Silurian. Now when we drilled . . .all the boys got together, Webb called them in one day and we talked it all over and we said, we should go west. The reason for going west was to get it a little deeper so you wouldn't be on the leakage end of the deal and a little more section. So when they found the reef they started running west. Now as they started running west they ran into Joarchim so they picked that up as an extra on the road but they were pursuing a reefal reversal of some sort. They ran the seismic and they spotted a well which if it had been drilled, would have been BA Perch, which was a dry hole. Because the reversal, naturally, on a homocline, takes place on the drape a little east of the crest of the underlying body that's causing the drape. And if they drilled BA Perch they'd have had a dry hole, which ultimately became BA Perch. However, they couldn't, I think there was a slough or something in the road so they moved just a little west of that and that gave them Leduc #1. Now Leduc #1 was drilled and they came down and they drilled into porous Devonian at the top and they called that the D-1. They went on down and they ran into the Calmar red beds with gypsum in it. They thought they had run into the McMurray salt horizon and therefore the game was over. So the orders, and I may be a little wrong on how I put this together, but Aubrey Kerr phoned in that they were in red beds. That was forwarded to I guess, the New York office or Toronto office. And the orders came back that they should shut it down. But they knew that this was going to come so, and I'm not quite sure how it was, Jack Webb held it on his desk a little longer and let the drill run and Ted Link held it on his desk to let it run a little longer and when they sent the orders back Ted Link was out of the office, maybe, and it was a little delayed sending west. And by the time the orders to shut it down got west they'd got into the D-2 and had the oil discovery. But they all wanted to see what was happening. So the initial discovery of Leduc was not the reef, it was sort of the biostroam??? that was the D-2. It wasn't till Leduc #2 that they went down into the reef. But it was just the foot dragging, they got about 4 days I believe extra, by dragging their feet, each on to the next. So they were able to keep the drill running just that few extra days to see what was below the red beds

#100 SB: So they had a strong idea that there was something there I guess?
CS: Well, they hadn't run into reefal material yet and they knew at Bruderheim they'd had reefal material. And it didn't matter what New York thought, they boys were pretty well

convinced that they might get something and they literally. . .well, they risked their jobs ???.

SB: I guess just before then, the New York office was more or less convinced that Imperial should pull out of Alberta.

CS: Well, Shell Oil had already pulled out of Alberta and I think that the New York office was getting a little flack maybe, from the industry big-wigs. It's a funny thing but the farther you get from the oil face the more sensitive the administrators get to the jeers of the other top men, you see, from other companies. They don't see it as work, they see it as sort of reputation.

SB: Did Ted Link play a kind of political role do you think, in keeping them there a little longer?

CS: Very definitely, yes. Because Webb reported to Link you see in Toronto and then Toronto reported to New York. So he definitely played a very positive role in delaying either the replies or the original. . .

SB: I guess he knew if there wasn't a discovery soon that would be the end of it.

CS: That might be. Of course, we had Joarchim by that time so it wasn't as bad, you know, it wouldn't have been as bad. They wouldn't have pulled out probably completely, but they would have probably stopped the deep play. As I said before, the affect of head offices is kind of funny. The time the Carter men came up to look us over then they decided there was no point in drilling south of Leduc. As a result Imperial wasn't allowed to look for oil in that direction. You see theories get popular and come and go and if you're on the right theory management buys it and if you're on the wrong theory management doesn't buy it. So right them there was this big hinge line concept. Therefore there could be really no accumulation below about Leduc. Well that wrote off an awful lot of oil and gas in a hurry.

SB: How about Ted Link generally, was a he a good spokesman for the industry do you think?

CS: He was a little abrasive towards nincompoops I guess and maybe he wasn't perhaps. . .internally of course, he was thought of very well by all of the fraternity, by the other companies, by his own company of course. Because he was the original discoverer of Norman Wells. And he certainly played a positive position in all the discovery of the western fields before Leduc came in. Everybody liked working for Ted Link, even though you might get a little abrasive treatment. That was just in good fun more than anything else. But I think some of the government people would have occasionally preferred a little more respect. But Jack Webb was the ultimate diplomat, he was courteous to everyone, finest gentleman you could ever find.

#150 SB: Do you know why Ted Link decided to go into business for himself?

CS: Yes, it was lonely in the east and no more than that. Everyone else was out here having the fun. I think they were going to move him to New York or something and he said, that's enough. Just for the same reason Jack Webb left, they were going to move him to Toronto and he said, I'm not leaving the fun of the game.

SB: So you stayed with Imperial until 1949?

CS: Yes, I was with them until '49.

SB: Were there any reasons for you leaving?

CS: No, I was just coming to teach. You see, I was going to Stanford at the same time I was working for them. At the same time I'd been commuting up here and teaching half time. Jack Webb understood I was going to go teaching.

SB: So you chose the academic route?

CS: I'd always wanted. . .I thought that Dr. Warren had the finest life in the world. And I have no regrets over having made that decision because I think I've had a similarly enjoyable life as he had.

SB: Is it 1951 that you got your PhD then?

CS: Yes, but I'd been teaching here a couple of years by that time. I finished off my thesis up here while teaching a full load of courses.

SB: What was you thesis topic then?

CS: My thesis was on the ??? of western Canada and it was actually on the lower Cretaceous, upper Cretaceous boundaries. At that time I changed the boundary from being at the Manville-Colorado boundary, which has always been used as the lower-upper Cretaceous boundary and I moved it up to the Fishscales horizon and that pretty well has stood ever since. Now I don't know whether it's stood ever since because nobody has really challenged it. But it may go a little higher, it may go a little lower but so far none of the evidence, and I've worked on the co-relative ??? ever since. So if there was anything more to turn up to set that away from the Fishscales I would have probably found it. So I had that. The reason I was able to afford to go to Stanford was that Imperial Oil had set up these fellowships. Being one of the first applicants, because I was in Imperial Oil I happened to know about it coming up. It wasn't perhaps too difficult to get one. There wasn't too many of us anyway, in the picture that would have been going on for a PhD. So when I finished my PhD I got the degree, of course, the thesis had gone in, sooner or later convocation comes around and you graduate but I'd gone to work for Pacific Pete in there. This syndicate I was connected with had already taken up the land and then it had gone over to Pacific Pete. Pacific Pete just asked me if I'd map it and John Browning was chief at the time, he laid out discovery wells and so on at that time and it wasn't until the spring of the following year that Les Clark came in. Pacific Pete was having a certain amount of trouble and he was sent in as sort of a watchdog, approved by the company that was financing Pacific Pete.

#208 SB: Was this the Bear Oil project?

CS: No, Bear Oil was a different sort of. . . I'm never sure just how Bear Oil was put together. It was masterminded by Pacific Pete and then I think there was other monies in it but I was never under Bear itself, I was under Pacific Pete. We drove a Pacific Pete. Of course I did that in the summer and took all the students out on that in order to get them work. So it was rewarding in a double way, first of all, we had a nice summer out of it ourselves, mapping, secondly the students all had jobs and thirdly we took a whole bunch of theses out of it and the kids wrote theses on these things. Some of them from the Bear Oil and some of them from the Pacific Pete ventures. But of course, back at head office there wasn't that much difference. And then likewise they found the St. John gas field. So

I mean it wasn't . . .it was really interesting.

SB: And I guess in the industry at that time the big push was being made for gas and proving gas reserves?

CS: Well yes. Although as always we'd gladly take oil. It's when you discover the gas then you've got the problem of pretending you like it and trying to sell it.

SB: Did it bring in a different group of people into the industry?

CS: Well yes, everything like that, you see about that time the Trans Canada Pipeline was going in. . .Inter Provincial it would be at that time, then the Trans Canada. But between the time that we discovered Leduc there was quite a flurry but before we were exporting it, or getting it our of the province by pipeline there was slump in interest. What good is it if you can't sell it. So there was a slump in interest and those were the couple of years that I took the students out because jobs had sort of dried up. Following that there was a mad scramble to drill everywhere because you had a pipeline going out. Then when they got the gas in in British Columbia of course, the hearings came on to export the gas and West Coast Transmission then was set up to export that gas. And of course, there was quite a flurry of exploration. I was partly connected with those days. By this time I was consulting a couple of years for Canada Southern. It was all the same job, it's just that when you're working ahead of discovery, as soon as the discovery is made that's old hat and you're on to the next. Well, it means that if your one company owns the land that the discovery's on, then basically, to an explorer, that's somebody else's worry. Those are the men that prove up these. . .after it's. . . So then you move out. Canada Southern had an awful lot of tie-in acreage.

#267 SB: They did a lot of work in the frontier regions, well the frontier at that time I guess.

CS: Well sure. You just kind of moved out. Because that's where the other men had gone that were doing the frontier work, they moved out from the centres of discovery.

SB: You mentioned before some work that they did on the Peale Plateau, was there a lot of groups that went up there?

CS: Not too many groups went up there but at one time there was a fair amount of activity. You see, every time you changed the regulations a little to make it a little more attractive people go and look at those places. That was of course, Harvie's group that went up there and drilled a chance well.

SB: Maybe it would be an idea to bring in the regulation side of it if you can.

CS: Regulations are very difficult for me to pin. It was the change . . .the B.C. government thought that they would have their own oil well and therefore they wouldn't let anyone else take out leases. That's how the Pine River #1 well was drilled. But then the war came on and the Peace River block, which was under sort of a quasi federal, inter-provincial regulation was, they said, well, the federal government should come and look at it. They came in and looked at it, but once again, there was still no leasing. Well then the Alaska Highway was being built and they wanted to perhaps look at leases but if it had been released for drilling, they decided to take the coal from Hudson Hope rather than worry about the drilling. For energy. But after the Canol project kind of died down then they decided to throw open leases in northeastern British Columbia and one of the earliest

groups was Pacific Pete to go in and ???.

SB: So they were able to get large areas, large blocks. . .?

CS: Very large areas, yes. The rental was very, very low. Then there was a lot of tie-in acreage then, following the discovery. A lot of little companies. The B.C. government didn't very much like these little companies. They would have preferred to have big land holdings and so on. But the little companies scrounged around and built a lot of little fields in, so I mean, I don't know what they were squawking about. As time went on of course, they tightened up the regulations and the rents went up and finally, when the NDP government got in in B.C. of course, they almost made it impossible to function.

SB: How about in Alberta, the Alberta government was encouraging. . .

CS: Yes, well the Alberta government was Social Credit. They had this extremely pragmatic politician, Manning, who was perhaps one of the most capable businessmen who ever hit Canada from the standpoint of sticking to business. The commission that Aberhart had set up, I forget what it was, I don't want to give a wrong name here, the commission was originally set up by Aberhart to see if they were better in the oil business or out of the oil business. It said they were better out of the oil business and they followed that, even though it might have been quite popular to drill your own wells and everything else. I don't think Alberta drilled its own wells until the last couple of years. It was just a couple of years ago that they thumbed their nose at the federal government.

End of tape.

Tape 4 Side 1

SB: So do you feel that they encouraged the development of Alberta through their regulations?

CS: Yes, the Alberta government was more concerned with concepts of conservation, good management, equitable marketing and secondly, after that, what the take for the Alberta government would be. Now what's fundamentally right about this, first of all, it recognizes that it takes a certain amount of effort to drill. If however there were more than one company interested in getting a lease, then they developed the auction type of thing where the highest bidder got it and this was a way of taking extra money, which perhaps was the fairest from the standpoint that it's open, the bidding is done, not in an open sense so one can bid above the other, but each one has to go and work it out on the computers or whatever they used in the old days and say, I think it's worth this or I think it's worth that. Then each one submitted their bid. It wasn't artificially inflated by a true auction, which can make. . .well, you can do a bunch of crooked business if you get these open auctions and plant people in them. So right from the first they ran it as a good business. Of course, as time went on the other government's got a little jealous of the way we were prospering I guess. But it was due to, as far as I'm concerned, Manning and Lougheed both stuck to business. I don't know what the rest were running around preaching political theories. The two of them were hard working men who stayed where they belonged, right at home. The result was that our regulations that have been developed are copied all over the whole world, we were the model for conservation

regulations. We were the first one to have a proper Conservation Board and keep proper records. You go down to the States and you can't find out who drilled what or when or where they got to. And established the core houses so that the record was kept. The Conservation Board set up then, was developed by Alberta and has been emulated by all the other responsible governments in the world. So it is from this standpoint of concentrating on the proper exploitation, it wasn't that you killed exploitation, it was the you exploited it properly. With the idea that exploited is the only thing that's of any benefit to anybody. The exploitation got into a bad frame of. . . it's one of the bad words now, exploitation. But if you don't exploit it, you might as well forget about it. And it was optimum exploitation for the good of everybody, including the company that drilled it, which was forgotten later on. Then everybody saw us doing it right, we were getting a heritage fund and then they screamed like mad. If they'd minded kind of their own business while we tended ours, they'd have been all right too.

SB: So during the 50's, what was going on from your point of view, were you working on any specific projects other than the consulting work you were doing?

CS: No. Well, what happened was in the 50's, I was consulting for awhile and then finally the salaries got to be high enough in university that you didn't have to work in the summer. You see, I started at about $2,000 a year here so it wasn't quite enough to. . . it supported me in the manner I'd been accustomed to but I wanted to get a little higher than that. So I had to work summers as well. I left here as soon as school stopped and didn't come back till school opened, that gave me enough money to live on. So as soon as salaries got up high enough, I didn't feel that. . . by this time I was also part of the supervisory board of the Research Council and I didn't feel it was quite right to consult in Alberta. So the consulting I did, any I did was done in British Columbia. And then I just more or less phased that out because there were other duties to do.

#061 SB: What about your own research?

CS: Well then, that allowed me, of course, I had all this stuff that I had collected for the oil companies. I had about 100 years of research piled up in the material I'd collected for the companies. And of course, any agreement I had with the company was that anything I collected was open for research. In those days we had no trouble with the companies. So I just continued on with the theses. We wanted to bring in a palynologist to the Research Council of Alberta. Nobody knew what a palynologist was in those days. Finally we talked them into it and they brought in Jack Campbell. But he was on the coal side and that isn't really what I wanted, I wanted somebody on the rock side. So I got a young student, named Chatanya??? Singh came in from India. I asked him if he wouldn't try and get it out of the rocks and he was successful in getting the spores out of the rocks. I don't credit him with being original on this, I just credit him with being very determined to get them out and he got them out with the result that he started the palynology investigations here, which of course, culminated in, Dr. Singh is with the Research Council. The last volume he has on ??? spores and pollen is one of the most beautiful coffee table books you ever saw. He's gone the next level, he has been recognized as one of the leading scientists in the world in palynology. But at the same time I'd been developing my own

research with Dr. Warren, Dr. Warren and I had a collaboration for many years on papers on ammonites of western Canada, lecipods???. And then I always was doing papers on the ??? mainly in conjunction with Dr. Wall, who by now also was another member of the Research Council but had been one of my students.

SB: What were some of the special interests of the Research Council? Were there any. . .?

CS: Well, the big interest of the Research Council originally you see, was to try and get the tar sands. And then Dr. Clark and Dr. Boomer had been employed, late 20's, early 30's but when they sort of washed out the Research Council almost as a viable entity, although it was still on paper, Clark was taken over by the mining department and Boomer was taken over, or perhaps he was always with the chemistry department. But anyway they put up their salaries and brought them in and salvaged them from disappearing with the Research Council. Clark was working on the tar sands and so was Boomer. Of course, Boomer's early death eliminated him and it was Clark then, that developed the hot water methods for extracting the oil, a modification that it still used today in the tar sands. Those men were not paid equal to what they finally accomplished, because I suppose discounted dollars, even if many, many billions, is not very much if you run it back 20, 30, 40, 50, 60 years. They were never rewarded monetarily for the work they did, but then that's typical I guess. So Clark then, after the Depression, after the war, you've got to get those out of the way, then they revamped it and Matt Grace came in and they put the emphasis on coal for awhile. Because you see, it was another decade before we actually had enough oil. So there was an interest really in coal there and they got the coal people started and that's when we were able to get Campbell appointed to palynol team and a lot of the men came in at that time. Then they got into ground water again and they started to expand. Of course they picked up this hail business and industrial minerals and then they got Dr. Godfrey to do the geochemical and the hard rock petrology. But finally, times changed, coal was no longer of importance for awhile you see, and they started to fade that down a bit again. And then the heavy oils, the price of oil was always dropping a little so it dropped a little more, a little more, a little more until of course, the Arab oil was flooding the world and it really had nothing much to do with the price. Then with the development of OPEC, suddenly research into coal blossomed again and research into heavy oil blossomed again. There was no limit on monies at this time. However politics take over and it's a little slow to see changes coming on the Research Council again.

#132 SB: The Research Council, how is it supported now?

CS: It's right out of the provincial government budget as far as I know. I don't know just how much true autonomy they have. They don't seem to have as much autonomy as we have in the university.

SB: I imagine there was a reluctance on the part of the rest of the industry to think about the tar sands and. . .?

CS: It's just the dollars and cents. And the moment the federal government got so capricious. You can't put $4 billion out on caprice, you've got to put it out on some sort of a solid guarantee that the rules aren't going to change. That's why the small plants are coming in now, you figure I can afford a couple of hundred million but I'm not going to risk those

other types of funds.

SB: How about your professional memberships? I imagine you've served on quite a few Boards and. . .

CS: No, not too many. I was with the Research Council of Alberta and I've served on the APEGGA Board for years for them. I neither seek office, nor particularly want it. But I've always worked in APEGGA, I'm still on the examinations board. I said examinations board, you know, and policy and membership boards, just the internal housekeeping.

SB: And you've written a lot of publications. Have they been mostly for other journals?

CS: Our first publications of importance was a run we did to get the Research Council back into publication. We turned out half a dozen in there, on micro-palaeontology and endemic ammonites in there. Then after that, I've always tended to publish in Canadian journals simply because I do write very much on Canadian content. I don't do international work, I figure I've got enough ground here.

SB: I notice you're a fellow of the Royal Society of Canada, what does that involve?

CS: In large measure it's an honour that comes to you when you have fortunately exploited a new field before somebody else does. I developed the field of using our nations palaeontology before it was recognized as a stratigraphic medium and because I worked with endemic ammonites, I suppose and started palonology in Alberta, I suppose that's the reason.

SB: How about the Crishman Foundation?

CS: That's micro-palaeontology group and I'm a micro-palaeontologist. Crishman was the great. . . really the first man to exploit the oil use of micro-palaeontology, make it commercial and academic at the same time. So that's why I belong to that society. Then of course, I belong to my local societies and my Canadian societies. And then I belong to the Geological Society of America, to give me input from the continent. And it's all across the board.

#189 SB: How about your involvement, you were mentioning that you've been with the Tyrrell Museum, you've been tied in with their. . .?

CS: I was on the committees that were set up to sort of bring in a pattern for what would be required if the museum was built.

SB: And how long ago was that committee formed?

CS: That committee was formed about 5 years ago I guess and disbanded about a year and a half ago. It was an ad hoc committee to get things going.

SB: So was the formation of Tyrrell Museum one of its desired goals?

CS: That was the only reason the committee was formed.

SB: And the recognition of it as a world heritage site?

CS: That was entirely political to start with, it had nothing to do with science. You run up the flag and say, gee it looks ??? but a man like Curry can probably take it to that height.

SB: How about your views of the general growth of the Albertan industry? Do you feel that it's going to thrive again?

CS: Industry, yes. But I think the beautiful days of exploration are slowly drawing to a close a little. Not that we won't have a lot of discoveries but the real excitement of being the

first, seeing the first pipelines built, that will fade. They'll say ho hum, another heavy oilfield. The excitement of seeing the first tar sands thing brought to actual production was pretty exciting because we'd watched Clark work in the 30's, all by himself, nobody cared. Max Ball came here and tried to get something going. And I mean, all those pioneers that went, they couldn't get anything going when they tried. To see that first plant produce was an excitement that it's hard to duplicate. No, I don't see that the industry is going to die. There's more oil in the ground than has ever been taken out because the average field, like in Pembina, if you get 15-20% of the oil out of the ground you are lucky. Well, then there's still 80-85% of the oil still in the ground. Well. . . it's going to take a lot more people to work out how to get that 85% out than it ever took to make the first discoveries for the first 15% of it. So what we have is we have the heavy oils, we have the oil still residue in the reservoirs and we have the tar sands. Not counting this deep basin business, which we haven't even tried to figure how to produce, more than perhaps the fraction of 1% of it. So the number of people that will be required to keep the industry going will be . . . but there won't be many people with a horse and a canoe.

#246 SB: How about the present frontier areas?

CS: The present frontier areas, you mean in Canada?

SB: Yes, like the Arctic and offshore?

CS: There's going to be a lot of exploration there yet. But one day I heard the government bragging that they were going to spend $2 million on something off the Beaufort. Was it $2 million. . . or was it $12 million, it doesn't really matter. Because it was going to take, they were going to drill this and you could figure that they were going to drill it and you say, how many wells will you get for that amount of money. And you found it was only half a dozen. If it takes 100 wells about, to make an oilfield, then suddenly you realize that if they only drill 6 a year, they'd either have to increase their spending budget or they would have to wait 15 years to have enough wells drilled. So they were talking frontier, the big trouble with them was that when they were spending big bucks, they weren't even in the ballpark for immediate oil.

SB: How do you feel about the Arctic, do you feel that they ever will discover. . .?

CS: There will be a lot of oil up there, and a lot of gas. But it will be expensive. All that happened was that instead of allowing the companies to go about their quiet business of lead time, the government got a little greedy, they thought that they could sort of kill the goose that laid the golden egg. The average person in Toronto I'm sure has no idea that it's 2,000 miles from Prudhoe Bay to Ellesmere Island. There's a lot of ground in there. There will be a lot of oil there yet, and gas found but it's just the logistics are terrible. You don't drive down the road to the next location. There's no reason it shouldn't be there but it's going to take time.

SB: What do you feel were the significant discoveries or the significant events that really changed the face of the industry in the early years?

CS: I once listed the 12 most significant wells. I would have to revamp the list a little now. But the original Turner Valley discovery, that's one and you can't deny it. The #2

discovery was the west flank of Turner Valley. Bob Brown moved west and got the oil from the Mississippian, that's definitely got to rank up there. The 3rd one happens to be one of the Lloydminster discoveries, whatever it would be, because that's all of our heavy oil, although at the time it wouldn't have appeared that significant. The 4th one of course is Leduc. No way you can deny, it has to be one of the best. The next one that I would have put, and it's funny, it wasn't a discovery but it was the Edson well that proved that you could drill in what might be called west Pembina. But it wasn't an exorbitant depth, we thought it would be 20,000' maybe, one of the Edson wells, out of Edson, was significant in that it proved. . . Then the other significant well for Canada was the Radville well at Saskatchewan that demonstrated there was a Williston Basin. We didn't even know there was a Williston Basin. And the other important well was the Spirit River #1, it was a dry hole, it wasn't a discovery but it found that there was an island in the middle of the Devonian Sea and of course, immediately led to the discovery of Gold Creek and Normanville and that whole ring, and Sturgeon Lake around the rim of that island. Of course, Norman Wells then becomes in this list because in essence, it is the only Northwest Territories discovery. Now I would say that one of the Delta wells then would come next. And that's the list.

#329SB: How about discoveries by people, scientific discoveries?

CS: Clark's discovery of how to handle the tar sands, how to recover them, that has to be the outstanding one. Seismic was the breakthrough, multiple seismic of course, has been the biggest development of a tool we've had in the last decade. Places like west Pembina and those would have been impossible without the development of the multiple trace seismic. And of course, that's in part because of computers. Before that of course, the big development at the end of the war that made possible the expansion of oil discovery in western Canada was the development of the tool steels, through their work with metallurgy to make battleship armour and things like that. Coming out of that intensive work that was done to develop armour came the tool steels that we have today that allow you to go to 20,000'. You could no more wangle the tools down much past 10,000', although they had done it, much past 10,000' without the string parting in the old days. So when Dr. Allen originally made the remark, he'd drink all the oil that developed west of the Calgary and Edmonton Highway, it was made in the light that you'd have to go over 5,000'. He was talking at that time, within the limits of the tools. And he just about would have been right. Under the limits of the old tools that's about where we'd have had to stop.

End of tape.

Tape 4 Side 2

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Tape 5 Side 1

CS: I asked to look at a well up north of there and they sent me the core. I forget what company it was but everybody knew everybody else's business in those days. When the

core came to me I looked it all over and I was rather interested in some stuff that was appearing in the bottom. But before I'd even sent the core back or even made my conclusions I got a call from Johnnie Carr and he said, I'd just like to know what in heck you wanted to look at that well for. I said, well, I thought as we kind of pulled away from the deep water up in the north there that we might get into some shallow water and perhaps find a reef and I was just looking for traces of a reef. He said, well, if you're so smart I'm sending you a Virginia Hills well. Then of course, I took a look at it and of course, there's reef in it. Right then of course, they brought in the Swan Hills well and they had me go down to Calgary and look at the core there and of course, once again, it's reef all right. That's all they wanted me and ??? but the only reason they'd sent it to me was that I'd already been sort of anticipating that they should be finding it in there.

SB: It seems like each major discovery was a different type of reef, you know, initially. . .

CS: Well that was it. And therefore, a lot of those came to Dr. Warren or myself because we were the only palaeontologists around that were free, that didn't either belong to the Survey or belong to another company. So we looked at a lot of these. Part of the deal was of course, we kept our mouth shut for a year, that's about all it was, and we got the fossils. So I dated Leduc originally, I came back from Stanford and the first thing I had to ??? there was to decide what the age of Leduc was and I dated Leduc at that time. Because they thought it might be Silurian because it was below the red beds you see. So there's still a debate going on. So when I decided that they were quite happy to take that. Similarly the red beds in the Pouce Coupee field were originally thought to be the same and of course, I did the fossils in that to show that they were Triassic. All that Silurian then turned over to the Triassic. Then of course, later on then, Shell went up and mapped the Slave River and the Silurian up there, it was supposed to be Silurian and it turned out to Devonian too. So we have wiped out the Silurian in Alberta pretty well.

#037 SB: I guess with Rainbow and that area, that was another surprise?

CS: Yes, that was a real surprise. That was extra good thinking on the part of, I guess it was Hryskevich wasn't it, on that one. The funny thing about Rainbow you see, when they first went in there, you had a low gravity run on your salt. And slow time on your seismic. So it made a low where it should have shown as a high. For that reason the first few wells that were drilled up in that region were just sort of off to one side of the reefs, not to the reefs, well, they were just a little offset is the best way to put it. Once they could read this properly of course, there was no trouble finding pinnacle reefs in that area. But when they're embedded in salt it makes for a funny sort of a picture. When you look back on it there was an awful lot of good men worked on these. The time they brought in Stettler you see, Gully and Lockwood had to put their jobs on the line to get the third well. They said, okay we'll give you one more well but if it doesn't come in you get fired. Sure it came in, sure Stettler is a pretty big field but people forget they laid their jobs on the line to get that next well. Even in the case of Leduc, as I pointed out, they risked their jobs by holding up the orders for a day or two just to take another peek. This is Nielsen, pretending he's got another target in order to be able to look at the target he really has because the target he really has, they won't sell. There's hundreds of cases. Adam

Crisken, in the case of ???, quitting his job in order to raise the money to drill the well that was the discovery because his own company wouldn't drill it. I mean this goes on all the time. You get a dream and you work it up and drill it in and a lot of it, then of course, when it comes in there's always the host of people say, well, it's just luck. Sure, it's luck but it wasn't if it wasn't directed right from the start. The idea of luck, you've got to have it no matter what. If the good Lord doesn't put it there, there's no way you can do anything about it.

SB: How about with yourself, what do you think were the more significant things that you worked on in the industry or. . .?

CS: I think St. John was the one in the practical sense. But I think the most important thing I did was turn out another generation of kids that, you'd be amazed at what they did, by luck or by smarts. That's my contribution. Teaching the kids to have faith in their geology in order to make discoveries. That would be the big thing I'd want to be remembered for, not. . . I think I was merely carrying on the tradition I was taught, that you can't go away from the rocks if you're working with them and I think that's the greatest thing I was taught by Warren and Allen and Rutherford.

SB: And they in turn I guess, had inherited that from the Geological Survey, that attitude?

CS: No, because they weren't industrially minded. No, the Survey gave the discipline but they were never sort of responsible for the next development. This was the philosophy that developed peculiarly in the west, where there was nobody else. There were just these 3 men up here and gosh, you could get the whole picture, it only takes a little picture like that to give all the geologists in western Canada ???. ???.

SB: It's changed a lot now. End of tape.