

MAURICE CARRIGY

Date and place of birth (if available):

Date and place of interview: Canmore, Alberta – Home of Maurice Carrigy

Name of interviewer: Peter McKenzie-Brown

Name of videographer: Peter Tombrowski

Full names (spelled out) of all others present: N/A

Consent form signed: Yes

Initials of Interviewer: PMB

Last name of subject: CARRIGY

PMB: Would you say something so I can just the...

CARRIGY: Yes, what's that little mic for?

PMB: Okay, so that's... I'm talking to Maurice Carrigy who was heavily involved with early oil sands research. We are meeting today in his living room and the people here are Peter Tombrowski, the videographer, myself and of course, Maurice Carrigy.

Maurice, I'd like to begin by asking you a little bit about your career, your early life and your career. So you were born in Australia?

CARRIGY: Yes, I was born Sydney and it sort of during the Depression that we were brought up so we had a lot of experience with hunger and general conditions during the Depression. I went to school, I went to a convent early on and then I changed over to the regular public schools about when I was in grade 9, and then from grade 9 to 11, which was how they used to, how the public system operated at that time, the education system and then from there got my leading certificate and went to work at the National Standards Laboratory in Sydney as an assistant, a blood assistant. And from there I went to... my father died when I was about 17 and I went on from there to become, I shouldn't say become, but my mother was having problems so I went to live with my brother in Perth, and in Perth I got a job at the university as a lab assistant at the chemistry department and from there I went to, decided I wanted to go to university so I got enrolled at the University of Western Australia and I graduated with a BSc in 1950.



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PMB: Was that a BSc in chemistry?

CARRIGY: In geology.

PMB: In geology, okay.

CARRIGY: In 1950 and then from there, I went to work. I got married in 1950 actually, so along came some children. I have four children.

PMB: What are the names of the children?

CARRIGY: The children, the first born was Molly, and the second was Colin, the third was...

PMB: C-O-L-L-I-N?

CARRIGY: No, C-O-L-I-N, and then when we emigrated to Canada, I got a job with the Alberta Research Council and, sorry, I forgot in the meantime, I worked at Bain Road in Perth as a Materials Research Officer.

PMB: Okay, we're at Colin, who came after Colin.

CARRIGY: Now, that was after we arrived in Canada that two others were born, Brian and Brendan.

PMB: B-R-I-A-N and B-R-E-N-D-A-N.

CARRIGY: B-R-E-N-D-A-N, yeah.

PMB: Thank you.

CARRIGY: So they were born in Canada. After we arrived and the Research Council I guess, I stayed there from 1957 until 1987 and that's when I began work on McMurray.

PMB: So when did you graduate from the University of Western Ontario?

CARRIGY: Australia.

PMB: Oh sorry, Western Australia. I beg your pardon.

CARRIGY: 1950 and again, I got an MSc in 1957.

PMB: Still in geology.

CARRIGY: Yeah.



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PMB: And during that period you worked?

CARRIGY: Between 1950 and 1957, I was at the, what we call the Bain Roads Department, which is equivalent to the highways department here, I guess, as a Materials Research Officer. That means I went out, we were looking for materials for road making, concrete, you know, construction and so on.

PMB: Asphalt and so on. And then you were offered a job in Alberta?

CARRIGY: Yeah.

PMB: And you took it?

CARRIGY: Yeah.

PMB: And that was in 1957?

CARRIGY: Yeah.

PMB: Okay can you continue the story from then?

CARRIGY: Well from '57 to '87, which is the 30 years we've talked about, my first assignment was to go up to the oil sands and I was working with Dr. Clark, who had just retired from the University and was sort of operating out of the Research Council and they thought it would be a good idea if he and I shared an office for the first year. So he sort of got me started, showed me a little bit about the oil sands and he wanted me to go up there and check, look at all the outcrops and then, particularly he wanted me to go up the Clearwater River and look at the boundary of the, eastern boundary of the oil sands. There was at least one outcrop, we had the oil sands and the clean sands, it was a boundary between them and so that's what I was doing. They had arranged for a helicopter to be available so that I could go up the Clearwater River and look at the outcrops and check on this boundary, which I did and what more should I say?

PMB: Okay, that's enough to start, because I believe that later on you created the first map, or geological map of North Eastern Alberta.

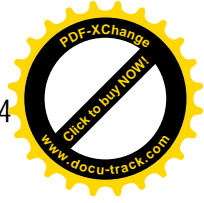
CARRIGY: Yeah, that had been started earlier by another geologist and he had left the Research Council and so they wanted me to finish the map which I did.

PMB: Can you give me your impressions of Karl Clark please, because I presume over a couple of years, you got to know him quite well.

CARRIGY: Oh yeah. He was, it's hard to say what the impression was, you know, but he seemed like a nice man. He was very knowledgeable of course and he took an interest in my work. He came along, and a couple of times, he had a lot visitors, people used to come to him from Texaco and



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various oil companies, Imperial Oil and so on and so I used sit in on the discussions he had with those people and it was quite interesting.

PMB: He would have been in his 60s by then wouldn't he?

CARRIGY: Yeah, well I think he would have been retired. I mean I'm not sure because I just arrived, I wasn't sure what the previous history was, but my impression was that he had retired from the council, from the University and was at the Research Council to sort of continue his work.

PMB: Okay so let's continue a little bit. You worked for the Alberta Research Council for another, well for 15 years altogether? Is that correct, from '57 to '72?

CARRIGY: Yes, that's right.

PMB: And, at that point then you went on to the Alberta Department of Energy. What were you doing there? This was the period 1972 to 1974.

CARRIGY: Well there was a, there was a sort of a period there where there was sort of a changeover. Peter Lougheed had been elected in 1971 or '72 I believe.

PMB: That government had taken power.

CARRIGY: Yeah, so there was a change and people were, you know, not familiar with all the happenings in oil sands at the time. Mr. Dickie was the Minister for Energy at that time.

PMB: That was Bill Dickie.

CARRIGY: Bill Dickie, yeah. He appointed my boss at that time, at the Research Council, **Barry Belen**, and he became the Deputy Minister and he and I were good friends. So he invited me over to work with him on oil sands as the Senior Advisor on oil sands for the government at that time.

PMB: Okay, and then if I understand this correctly, you wrote the AOSTRA Act in 1974 to '75?

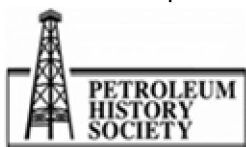
CARRIGY: Yeah, however they were, well, I was the senior advisor there, they announced to Mr. Dickie, I think it was Mr. Lougheed announced the availability of \$100 billion dollars to improve the technology.

PMB: A hundred...

CARRIGY: \$100 million.

PMB: Million: I thought you said billion. One hundred million dollars.

CARRIGY: Yeah, and so we got a whole lot of people involved, of course. But I was the person who was the person, sort of coordinating the activities and writing the actual act deciding on what it



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would do and who would do it, who would be, how the operation would proceed, and that was, that took about a year and then they had involved deciding, you know, how we would handle the proprietary information, how we could get industry involved without sort of losing the technology. We wanted the time to have the control of the technology to reside in AOSTRA, which is what we used to call it, the Alberta Oil Sands Technology and Research Authority and I don't know who thought up that name, it's quite a mouthful. And so for the first year, I was, I think there was some sort of a feeling that there was a race between the Federal and the Provincial Governments as to who would control the oil sands at that time. There seemed to be an urgency to get this \$100 million dollars into operations so that the Alberta Government would have shown that it was actively involved in oil sands and wanted, really wanted it to proceed.

PMB: And then for period 1974 to 1987 you were in charge of actually, ultimately authorizing the funding of oil sands projects.

CARRIGY: Yeah, we had the \$100 million dollars was made available and that we would, we formed a group who would, the first group that was formed, this was before the... after the act was sorry, (promulgated) I don't know how you call it, what word to use.

PMB: That's a good word.

CARRIGY: And so they appointed an interim group which consisted of myself as chairman, and a couple of people who were involved in oil sands and stuff, Gishler, Dr. Gishler.

PMB: How do you spell that?

CARRIGY: G-I-S-H-L-E-R.

PMB: G-I-S-H-L-E-R.

CARRIGY: Dr. Gishler, and Peter Johnson and Ed Ballantyne.

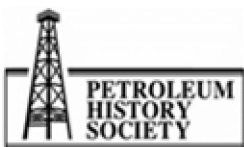
PMB: Ed Ballantyne. B-A-L-L...

CARRIGY: Dr. Ballantyne, he was the Deputy Minister of Environment I think. So the four of us started it off and then later on we started looking for a permanent head for AOSTRA and we eventually hired Dr. Bowman, Dr. Clem Bowman. And so that was how we got started.

PMB: We interviewed Clem Bowman about three weeks ago.

CARRIGY: Oh did you?

PMB: Out in Ontario, yeah. Okay and later on, if I recall, you became the head, after you retired from the government, you worked for the United Nations at an organization called UNITAR. Can you please explain that to me and tell me what you did?



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CARRIGY: UNITAR. While we were sort of getting operational with AOSTRA, Dr. Barnea from UNITAR called.

PMB: How do you spell that? B-A...

CARRIGY: B-A-R-N-E-A.

PMB: B-A-R-N-E-A.

CARRIGY: Yeah and he was with UNITAR and he called. He wanted to see if we could finance a conference on heavy crude and, what was it, I forget the name of, the exact name of what it was...heavy crude and oil sands or tar sands, I think, I should check that out.

PMB: It was probably tar sands; that's the expression people still used in those days.

CARRIGY: Yeah, so he called me and he said he wanted to arrange this conference under the UNITAR sort of label for the United Nations. And so eventually we decided, yes we could hold this conference, because it was a big deal at that time, because it involved the UN and it was a whole lot of people that he would arrange to attend the conference.

PMB: Was the conference in...

CARRIGY: The conference was...

PMB: Bermuda?

CARRIGY: I don't know where he initially wanted to hold them but eventually we decided that, we discussed with the government and they decided that we would hold it in Edmonton. So we had that first conference in Edmonton, it was called the First Conference, UNITAR, UNDP Conference on Heavy Crude and Tar Sands and then he had some grand ideas about how he would bring all his people in by plane and invite all these high-powered dignitaries to attend and eventually we finally got the conference under way, I think it was 1974.

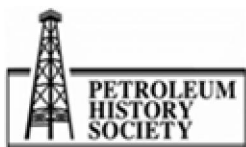
PMB: Did you say 1974?

CARRIGY: Yeah.

PMB: '74, okay.

CARRIGY: No, it might have been later than that, it might have been when we started, and I'd have to check on when that conference took place.

PMB: Your date is probably right. I had moved forward in my mind to about 1990 when you went to New York. Please tell us about that conference.



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CARRIGY: That might have been 1979 now I come to think of it, but I'm not quite familiar, that was so long ago that I'd almost forgotten. But subsequently these conferences were held every four years, the second one took place in Venezuela, and the third one, I'm not sure, but it might have been back in Edmonton. Anyhow, so a group of people got together to organize these conferences that were held under the auspices of the United Nations, UNITAR, which is United Nations **integer** for training and research and that, and with the United Nations development program, so the **UNITAR UNDP** name, that's how it came about. So they were holding these conferences and the people involved were the Venezuela, AOSTRA, U.S. Department of Energy, I don't know, I'd have to check and think about who the other people who were involved but the, primarily AOSTRA, PDVSA, as they called the Venezuelan company and the U.S. Department of Energy, those three groups were really involved in sponsoring this thing.

PMB: Okay, and then?

CARRIGY: And then eventually it, Dr. Barnea died I think in about 1989 I think it was, and they asked me then to take over this company, or it wasn't a company, but it was a...

PMB: A department I suppose, or...

CARRIGY: Yes, it was a...

PMB: An agency of the UN?

CARRIGY: An agency of the UN. And that was called the Information Center for Heavy Crude and Tar Sands, I think, I would have to check on that again, because I don't know the exact name.

PMB: Information Center for Heavy Crude and Tar Sands.

CARRIGY: Yeah, I'd have to check on that though.

PMB: And that took you to New York?

CARRIGY: That took me to New York. Initially, they were organizing a conference in Venezuela at that time so they wanted somebody who was familiar with what was happening so they could continue after Dr. Barnea died to hold this conference in Venezuela and it was being sponsored by PDVSA.

PMB: I'm trying to remember how to spell PDVSA.

CARRIGY: P-D-V-S-A

PMB: P-D-V-S-A



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CARRIGY: Petroleos de Venezuela...you know, I'm so rusty on these things I've forgotten and it was... So they were organizing the conference and it was very interesting because just at the time that the conference was being organized, we were almost ready to go and the crisis in OPEC took place. Venezuela was a member of OPEC and OPEC wasn't very interested in having the oil sands come into production because it was a sort of competitor, an alternative to the light oil that they were trying to sell.

PMB: And the crisis at that time, if I recall, was that oil prices had crashed in 1986 and they just continued really low until around 1990. They peaked a little bit during the first Gulf War and then it took forever, it took another ten years or so for them to begin to recover. Is the Gulf War the crisis that you're thinking of?

CARRIGY: Yeah, that's just before the conference. We were all ready to go, we had all the papers, we'd organized everything and they PDVSA cancelled it. We were going to hold it I think in April, and they cancelled it because of the pressure from the other members of OPEC and it wasn't reorganized again until August. For that time, during that time they cancelled the whole thing, in fact, it was on the eve of the conference that they cancelled, people were already in flight and were going to the conference and the President of Venezuela, at that time, decided he couldn't hold a conference.

PMB: Now I just want to be clear, there were two things that were going on about that time. One was the Gulf War and one was the decline of oil prices. Which was the crisis that caused him to cancel the conference?

CARRIGY: Now, you've got me there. I'm a bit vague on the time.

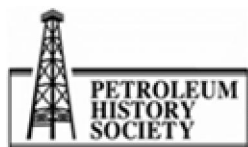
PMB: Perhaps it was the oil prices. You said you were concerned, or people were concerned about this becoming a competitor to light oil.

CARRIGY: Yes, I'd have to check, because I wasn't expecting to get into this. I can't just recall the details. I know that it was a real blow to me at the time because I was organizing the conference and it came right out of the blue.

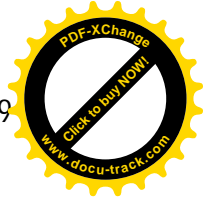
PMB: So you continued into the following August, when you did hold the conference. Did you hold it in Venezuela?

CARRIGY: Yes, we did hold it in Venezuela, and it turned out to be quite successful at the time, but it was sort of a real worry to me at the time that it had been cancelled while people were en route to the conference. PDVSA sort of took control of it and they reimbursed all the people that were coming and paid them all. And they decided that they would hold the conference later on and so it was quite a... You know, I felt really bad about it at the time.

PMB: Okay, so let's continue, can you tell us a little bit about when you learned about the oil sands? Well, you told us about how your personal involvement developed, but let me ask you this, when



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you first began to understand the oil sands after you'd been with the Alberta Research Council for awhile, did you have a sense of their potential?

CARRIGY: Oh yes, all the time we realized that they were potentially, there was a lot of talk at that time about people running out of oil, you know. The world was running out of oil, the Club of Rome was predicting dire consequences that they were...

PMB: Okay, I remember the Club of Rome book. If I'm not mistaken, it was published around 1970.

CARRIGY: Yeah.

PMB: But you had been involved in the oil sands for 13 years before that.

CARRIGY: Well I'm thinking of how the oil sands, maybe I jumped ahead a little bit, how we sort of felt about the oil sands, that they were essential to go over the transition between when the oil ran out and when... I probably was thinking more here, when the UNITAR people were coming, came over.

PMB: Okay. In the earliest days, what was your thinking, because remember it was ten years after you got here that the first oil sands project was built and of course was Great Canadian Oil Sands in 1967.

CARRIGY: Well when we arrived there was a company in, Dr. Graevenor who hired me at the time said that there was a company...

PMB: Graevenor. G-R-A...

CARRIGY: R-A-I-V...not quite sure how to spell that, Graevenor.

PMB: G-R-A-V-E-N-O-R?

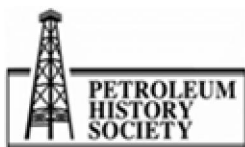
CARRIGY: I think there's an A-E...

PMB: G-R-A-E-V-E-N-O-R.

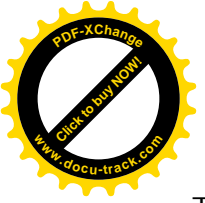
CARRIGY: [laughs].

PMB: Okay, we'll use that for the time being.

CARRIGY: Yeah, well he said that there was a company interested in developing the oil sands, that was in part of what he said in his letter and I think it was called Royalite. I don't know, you know, someone knew that at that time that I had no idea who Royalite was or what they were doing, but there was a big fuss about Royalite developing government to commercial operations at that time.



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That's the name that I was using, I don't think people talked about Royalite, and it seemed that he sort of felt there was an urgency to find out more about the oil sands, how extensive they were, we had a lot of information from the outcrops and there was a fair amount of drilling going on because people had leases, had leased out areas, most of the major oil companies had leases and they were drilling these leases at the time, and they wanted me to correlate the information that was coming from these drilling operations, put them together so they had a better idea how extensive the oil sands were because we weren't, at that time we didn't know beyond the outcrops how far they extended, oil [mumbled] were. So that was my job and eventually we published a map, a geological map and I worked with the Energy Resources...

PMB: Conservation Board.

CARRIGY: Conservation Board and together we sort of put a map together showing an outline of the state of the oil sands.

PMB: So all of the oil sands was published?

CARRIGY: Just the Athabasca.

PMB: Oh, just the Athabasca.

CARRIGY: Yeah. I didn't have much to do with the other deposits, they came later and in fact, I think it was Imperial, I think was involved in the Cold Lake discovery, or I'm not sure who discovered it but they called it the Cold Lake and so eventually we extended to the Wabasca and the Peace River and it had this belt of impregnated limestone underlying the oil sands and so it...

PMB: Bitumen carbonates, as it's now called.

CARRIGY: Bitumen, yeah, so all that came while I was working on the Athabasca deposits.

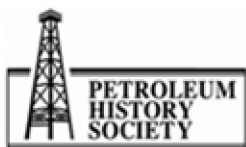
PMB: So really it was when you first came, it was really only the Athabasca deposit that was particularly well known.

CARRIGY: Yes.

PMB: And the others came much later. I want to go back a little in your story to your work with AOSTRA and the AOSTRA funding. I know that Imperial Oil refused to accept any AOSTRA funding. Were there any other major companies that didn't?

CARRIGY: No, I wouldn't say that Imperial didn't accept any, one of the first projects we did with was with Imperial Oil, it was the, they had a process called flexi-coking.

PMB: I'm sorry, a what, a process?



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CARRIGY: A process called flexi-coking for upgrading.

PMB: Flexi, F-L-E-X-I, coking, C-O-K-I-N-G.

CARRIGY: Yeah, and Clem Bowman who had come over from Imperial was aware of this and...

PMB: What is his name?

CARRIGY: Clem Bowman.

PMB: Oh Clem Bowman, okay.

CARRIGY: And he had suggested that it would be ideal if we provided Imperial with a car, a couple of carloads, I don't know how many thousand barrels it was, of oil, to run through the flexi-coking pilot plant which was in, down in Southern, I think it was, no it wasn't in Louisiana. It was on the Gulf Coast anyhow, I'm not sure where. Clem would know all this, maybe he mentioned it, I don't know. But that was the very first project we did and we gathered up Imperial's several carloads sent by rail, down to, what's the name of the refining area in Texas?

PMB: Well it's in the Gulf, the one on the Gulf Coast, I know which one you mean. It's in the Houston area.

CARRIGY: In the Houston area, yeah, and they ran this bitumen through the flexi-coking plant and they provided us with the information and we got some rights, we got the right, I think, to use that process for any AOSTRA operations if we were involved with people...

PMB: Was it a success, the flexi-coking?

CARRIGY: They had a fair number of problems with the flexi-coking, I mean, I shouldn't say what they were but they...

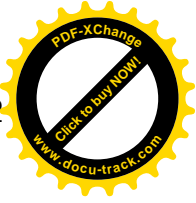
PMB: So it was a test is what it is.

CARRIGY: It's a test and I'm not sure whether they eventually used it in Alberta or not. but I know I went to Japan later on to see a flexi-coking operation at a refinery in Kawasaki I think it was. And so they did use flexi-coking for upgrading elsewhere, but I'm not sure whether they used it in Alberta or not.

PMB: Okay, now another question for the early days of AOSTRA, I heard from somebody that some of the early AOSTRA projects had to do with minable technology. I heard that from one person told. Other people have said no, it was all about in situ or underground recovery. Can you clarify that for me, please?



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CARRIGY: There were no restrictions. We were willing to put money anywhere. Where there was a blockage or a problem, AOSTRA was willing to put money into it and we decided that there was so many people, you know, claiming to have developed processes that were viable and you know, just merely commercial that we decided that we'd put to rest all of these claims and get down to the ones that were commercially viable.

PMB: Did you fund projects for Syncrude and what's now Suncor, Great Canadian Oil Sands?

CARRIGY: Now I'm just trying to think back, we would have if they had come and if we thought they were viable.

PMB: That's fine, because that's been an issue of contention among our little management team, so thank you for helping to clarify that. How successful would you say – I'm going to ask you about Dr. Roger Butler later on – but how successful, up to the time the SAGD process was developed, were the results from the AOSTRA funding?

CARRIGY: Well the AOSTRA funding was designed mainly to get people over any problems if they were sort of, come to a point where they had got close to but not quite ready for commercial operations so we were looking to fund them to get them over the hoop, out of the top so that they could get something that was commercially viable. So now can you tell me what's the question again?

PMB: Okay now, as I recall the funding was match funding, so if I need \$2 million dollars, I would put in a million and AOSTRA would provide an additional million.

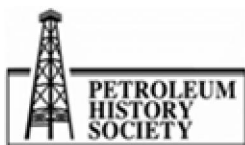
CARRIGY: Yes, that's correct.

PMB: And AOSTRA would also provide some technical expertise. So therefore, if you had a hundred million dollars that you would invest, that in effect levered the amount of money being invested in experimentation up to \$200 million dollars. So I guess part of my question is, putting SAGD aside, how successful were the first let's say ten years of operation of AOSTRA?

CARRIGY: That's a hard question to answer. I hadn't thought of it as to what, I sort of lost contact with a lot of this stuff. I didn't know for sure, it hadn't occurred to me to think about that.

PMB: Okay, fair enough. Now I would like to ask you about Dr. Roger Butler, he's pretty legendary and of course, unfortunately, he died five or six years ago so we can't ask him these questions ourselves. What is your impression of him as a man and what was your impression of the time of the SAGD?

CARRIGY: Well it wasn't called SAGD time at that time, we were experimenting with... when Dr. Butler, who was with Imperial Oil, as you know he was sort of a colleague of Clem Bowman and he had developed the, when he was with Imperial Oil, he had got the idea that if drilled a vertical well and a horizontal well that got crossed together, that by putting steam into the vertical well he would



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eventually get production from the horizontal well. I think Imperial tried that out and I don't know whether it was successful or not, but about that time, he was going to leave Imperial Oil so Dr. Bowman said well come over and work with AOSTRA and it seemed to me that Roger Butler was more of a scientific person and maybe the Imperial Oil people were more interested in practical things and he was sort of theoretical more than practical at that time.

And he was interested in, he got the idea that two wells drilled, if you put steam into the bottom well you could. I think he realized then, a lot of the industry people were all trying to push the oil through, and the oil was so thick, you know, there was no chance that you were going to push it from A to B. The reservoir people in the industry used to like a liquid that they could push from one place to another and it was quite obvious to most of us that heavy thick bitumen, that you couldn't push it anywhere, that it wasn't practical to push it. So Roger did think, well maybe we could sort of leach it with steam by putting steam into a lower well you can gradually work. The steam would rise, condense and drop down into the lower well where it would be a sort of mixture of oil and water that you could then bring up to the surface. But it involved horizontal wells which was sort of alien to the industry at that time.

PMB: Fairly new technology by then.

CARRIGY: Yeah, it was the sort of total revolution and the concept of what you could do with bitumen that you couldn't use traditional reservoir parameters to produce it, you had to...

PMB: So you didn't push it through, you pulled it out.

CARRIGY: You sort of got it into a form where it was either emulsified or liquefied so that then you could produce. And in order to do that, of course, you had to heat it, although some people thought that you might be able to do it with liquids, you know, solvents. But I think Roger's idea was that, his big idea was that you didn't actually try to push it, you used the steam to heat an area and gradually form a...

PMB: Steam chamber.

CARRIGY: Steam chamber that would then, the oil would gradually come down the sides and into the production well below it. The big problem was, how we could drill the two wells, how we would control them, how far we could go with these wells and keep them close together. They had to be a certain distance apart, and if they weren't certain distance apart the drilling technology was such that the wells used to go up and down, they couldn't control the direction and the height of the wells so that they were two parallels. And it was at the Underground Test Facility where we pioneered that. We built a special drill and guidance system that allowed the two wells to go parallel to each other.

PMB: Okay, I'd like you to pause there, give you a minute to reflect. You were heavily involved in the design of the UTF. Can you describe the design and talk about its significance, and then of course, the results that you got? And you began to develop this in what year? When did you actually begin construction? Was it '87?



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CARRIGY: '82, I think. There's a whole history involved which I can give to you. The opening of the Underground Test Facility, I went through all the history and all the people that were involved in getting to this point, but there was an industry group called MAISP, which was developed.

PMB: I'm sorry, what is that acronym? M?

CARRIGY: Mining Assisted In-Situ...

PMB: Production. M-A-I-S-P.

CARRIGY: Project, I think it is. We had approached AOSTRA, this was, no, I don't have any idea of the dates I'm afraid, but earlier on, and they wanted to, they had heard about a place in Russia, called Yarega, it was called, where they were putting steam into the reservoir. They had mined a tunnel into the reservoir and had to drill holes in the surface at angles to put in steam and they were actually right inside the reservoir and they were producing oil and it was interesting that, you know, that was possible.

PMB: Now were you part of a group that went to see this project?

CARRIGY: Yeah, I went, AOSTRA and several oil companies, I can't recall their names, but I can get you all this information and we went to Russia to have a look and actually go down the mine and see how they're producing. What was interesting to me was that they had a tap, you know like a tap you would see on a plumbing, on a bathroom tap, and they would turn that on and off to get the oil out, it was a...

PMB: What part of Russia or the old Soviet Union was this, what part of the country was this?

CARRIGY: It was the badlands.

PMB: In Siberia?

CARRIGY: No, it was about 180 miles north of Moscow I think.

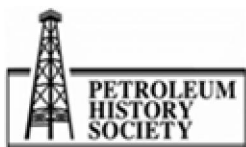
PMB: Okay, so it's fairly central with the eastern ringe.

CARRIGY: Well it was a long way away and we went in by plane and that's a story in itself. Anyhow we got Yarega and they kept us in the dark. We waited until midnight to go down the mine.

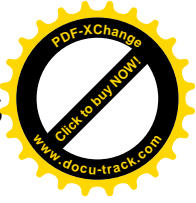
PMB: What is the name of the town?

CARRIGY: Yarega. Y-A-R-E-G-A.

PMB: Y-A-R-E-G-A.



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CARRIGY: Yeah, it was in the place in the District of Russia called Komi, K-O-M-I, and it was, I seem to remember the name O-L-E-N-E-K, there's a lot of oil fields in that area.

PMB: Okay. O-L...

CARRIGY: E-N-E-K.

PMB: E-N-E-K. Good. Okay, so now roughly what year did you make that trip to the Soviet Union?

CARRIGY: You got me there.

PMB: Around the mid-80s would you think?

CARRIGY: Yeah, I could tell you exactly but I can't remember exactly, but it...

PMB: That's fine, but basically this opened your eyes to the possibility of using a technology like this in Canada for the oil sands.

CARRIGY: Yes, we had the idea at least, it was in my mind all the time that we could go below instead of working from above the oil sands, we could below and work from below and that was what I was interested in was giving access from below as to, so we could use gravity as the driver in getting the oil out. So that it would be natural, it would come down and flow in and then we'd take it from below rather than pulling it up to the surface.

PMB: And so when you designed the UTF, so this I believe was in the later 1980s, can you describe the design and the structure to us?

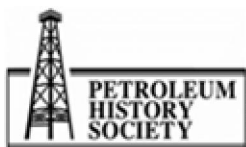
CARRIGY: Well we got a mining engineer; in fact, he lives here in Canmore, Gerry Stephenson, because Fred Kidd, who was the MLA, he was a geologist and he was also, what did they call him? He was appointed to the AOSTRA board at that time.

PMB: That was Fred Kidd, K-I-D-D?

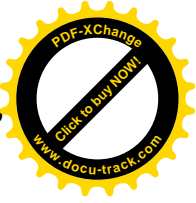
CARRIGY: Yeah, Fred Kidd. And he knew that the mine in Canmore was closing down and he said, well I know a fellow, Gerry Stephenson who was the mine manager. I wonder if he could help us and so, did I say Fred Kidd?

PMB: Yeah. Well Fred Kidd who suggested the mine manager.

CARRIGY: Yeah, Gerry Stephenson, so Gerry worked with us on the design of the project and he added a lot to it because he knew, you know, you had to put down two shafts, you had to have a ventilation shaft and an access shaft for materials and so on, and how to do the tunnelling, which



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was in the limestone underneath the oil sands. We knew there was a competent bit of limestone underneath the oil sands that we could access rather than go into the oil sands.

Although we did contemplate going right into the oil sands, we thought it would be better to go down below the oil sands, put the tunnels in a secure and safe place and then drill upwards from below and do the horizontal wells from below the oil sands and into the oil sands. What we didn't know at that time was that there wasn't a drill available that would handle liquids and all the previous knowledge was really in the mining industry where you were dealing with solid rock and sort of stoking up into the ore body. So you can consider the oil sands as an ore body and we were underneath and we were going to, some thought that actually, and it was put out in a previous oil sands conference in the 1950s that you could go beneath the oil sands and you can withdraw them down into the tunnels and then take them back up to the surface so that you wouldn't be disturbing the surface, you would be sort of using mining as an ore body from below and then we were even contemplating testing that out at the Underground Test Facility at one time, but, in the end it turned out that we, sort of, worked with a drilling company in Calgary to develop a drill that would drill up in to the oil sands and then go horizontal at the base of the oil sands. All in the same time, Roger Butler was developing this concept of, this two well concept and putting the steam in and collecting the oil from below and we had a group that was working independently more or less, of Roger Butler, developing, putting the meat on it more or less, developing into a process rather than a concept and so that was how the SAGD came into...

PMB: So you had originally developed this underground test facility based on some ideas that came out of Russia, or the Soviet Union.

CARRIGY: And this may sort of digress from the basic idea, they would try to access it, but they were more interested in accessing horizontal, drilling the horizontal wells from the surface, like oil...

PMB: Sorry "they were" meaning, Roger Butler?

CARRIGY: No, this was the independent, did I tell you about?

PMB: I'm sorry I didn't understand what you just said.

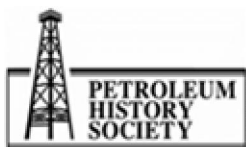
CARRIGY: Yeah, I didn't understand what I said [laughs]!

PMB: [laughs]!

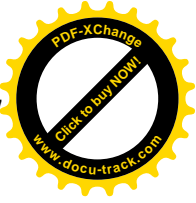
CARRIGY: The MAISP people were working independently but they were thinking of production from horizontal wells in the usual manner, not Roger Butler's idea.

PMB: Okay, so the MAISP, M-A-I-S-P, those people were interested in drilling horizontal wells, but from surface?

CARRIGY: Yeah.



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PMB: But your idea was to go down and test it from an underground facility where you could drop through the limestone and then drill horizontally into the oil sands.

CARRIGY: Yeah, we thought we would have more control over production than pumping it up to the surface and we were closer to the operation, I'd say.

PMB: Okay, so can you tell me about your first experiments or your first tests at that facility.

CARRIGY: Yeah at the...no, I was the, a little bit removed from this because...

PMB: The facility itself was in the Athabasca Oil Sands?

CARRIGY: Yeah.

PMB: It was near Fort McMurray?

CARRIGY: Yes, it was in from Syncrude, it was, several miles in, but we had picked out an area where the oil sands were. Then we had specifications for how thick they had to be, how we did not want any layering in between, we didn't want any obstructions. They wanted a complete homogeneous section of oil sands that had a certain amount, contained a certain amount of bitumen and so we had a group, they investigated quite a number of possible sites but we ended up at site, I think it was near Fort McKay, but inland a bit. We can find out where the exact was.

PMB: I'm sure we know. So your first tests?

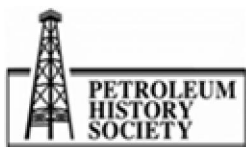
CARRIGY: The first tests were done. It took quite a long time to get this horizontal, you know, the parallel wells done, but they were. Now I can't tell you exactly when it was started. We had to put a lot facilities on the surface to get the steam down to the wells, where the wells were and that had a lot of technical stuff involved in that and we eventually got the steam down. And then they started putting in the steam and then these first couple of wells were relatively short, so we got some...

PMB: What were they, a couple hundred meters?

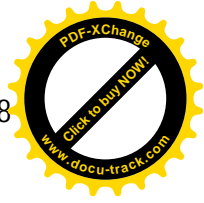
CARRIGY: Yeah, you're asking me questions that I don't know. You'd have to talk to the people who were actually doing it. But they had a relatively good result from that and they were producing some fluids that did contain oil, so they were really happy about that. Then they extended it out to a second phase where they were drilling longer wells and one of the problems was getting the steam to the end of the well. You know it would condense before it got to the wells, so it was sort of a whole operation just trying to get the steam to the right place. I'm sure they had problems you know, with drawing the oil out the second well and yeah, I'm just fuzzy with the details.

PMB: Okay, but in the end, it was an incredibly important development.

CARRIGY: Yes.



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PMB: And I've seen statistics that maybe the development at SAGD, what you did there, might eventually lead to the recovery of hundreds of billions of barrels of oil from the oil sands, wherever those numbers come from.

CARRIGY: We didn't... another sort of, not a problem but a benefit of going from below was that we didn't, and the SAGD process it was that didn't require... There was an area between the mining area where you set a certain overburden and you couldn't go deeper than that because it was uneconomical, and there was another area where we figured that you had to put in steam at a high enough pressure to keep the temperature high enough to work these other sort of huff and puff processes that were in operation at that time and there was this sort of no-man's land in between where it was too deep to mine and too shallow to put the high temperature steam in and that was... The idea at that time was that we had to develop a process which was really the major part of the oil sands was in between these two areas. The idea was that if we could develop processes that didn't require high-pressure steam and would work at a reasonably low pressure and temperature that that wouldn't be the most beneficial area to work in.

PMB: And that was an important part of the concept.

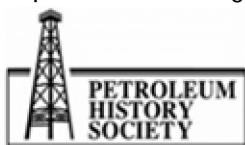
CARRIGY: That was the concept, yeah; that we had to find a process that was in between these two.

PMB: Now, I'd like to ask you one question. In your notes that you sent me, you've given me some interesting thoughts on this, what you think about the role of government in oil sands development. Has it been successful and supportive, has regulation been effective or should it be more stringent?

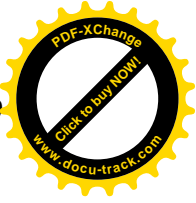
CARRIGY: Yeah, well didn't I decline to answer that question?

PMB: Actually, you gave a very interesting answer in here, and I'm going to refer you to it. It's at the top of the second page of your notes. Because I think your ideas are very thoughtful, I would like to hear them in perhaps in your own words.

CARRIGY: Yes, well I know at that time, when I arrived in 1957, as they said here, the government was trying to attract industry interest and it was really, it felt that the... Although we had developed the hot water process, Dr. Clarke had developed the hot water process, the industry wasn't sort of taking it up to the extent that they thought it should be. And they were, they had developed pilot plant at Bitumount and, I think that was in the '40s. You know, there's a whole series of pilot plants in the whole history related to them, but the government thought they had demonstrated the hot water process at Bitumount and that it was sort of [not understood] and that the industry wasn't taking it up. And so they were trying to get people interested, they held this conference, I think it was about 1948, the first start of these oil sands conferences. They invited the industry to participate and in the conference, it sort of gave them some guidance on how they should proceed and out of a lot of this there came the idea that they should issue leases, give the industry leases and so the industry sort of took this up. And they all bought these leases and these leases required them to explore and if the government, if the minister thought they were ready for development then he



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could order them to do, to build a plant of a certain size. And if the industries, if they weren't ready to do that then they could give back the lease, and that was a real concern for the industry at that time, but the government was really desperate to sort of get something going.

PMB: Now you make the, well I think is a really interesting argument in here, that until really quite recently the oil sands industry was a government-led industry.

CARRIGY: Yes.

PMB: With the government doing the research, the government offering the incentives, the government providing the initiative and the government often being the leaders, providing the leadership in this.

CARRIGY: Yes, and that was the way it was until very recently, until Great Canadian, as it was, Sun Oil at that time. Mr. Pew, and the theory is that he decided that it was time to get into the oil sands and they had acquired the best deposit through the whole history of Abasand Oils, and Abasand had really... The Federal Government had decided they wanted to produce oil during the war, there was some war effort at that time, but that plant, which was using the Federal Government's cold water process had burned down, but because of the expenditures that the Abasand people had made, they were allowed to select another place where they could, there's a whole history behind this. The Federal Government was drilling up various places under the war effort idea to try and select the best place to put a plant, and they ended up at Ruth Lake which is where Great Canadian is now. They discovered what was the richest deposit in the oil sands, on Federal Government lands, at that time. So Abasand acquired that lease and then subsequently it was bought by Sun Oil.

PMB: You know, the argument is that it was Mr. J. Howard Pew wasn't it?

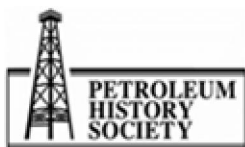
CARRIGY: Yeah.

PMB: J. Howard Pew decided to get into the oil sands. I believe that in fact, his close friend was the Premier of Alberta and he really encouraged him, so at every step of the way, I'm following up on your idea here, and every step of the way it has been government at some level that has been encouraging this to take place.

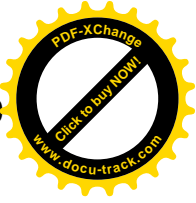
CARRIGY: Yeah, that's the whole concept.

PMB: And the research was either funded by government or it was undertaken by government or universities and that only changed within the last 10 or 15 years, perhaps.

CARRIGY: Yeah, well after, I wouldn't say 10 or 15, say, until Great Canadian went into operation on the mining area, but on the in situ and other areas, the government still had to transfer from the hot water process to try and develop another process that would unlock the oil sands from the total area.



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PMB: And in terms of the stringency, and I'm thinking of your environmental restrictions, has that been adequate? Has it been appropriate over the years in your opinion, or has it improved enough? Is it too stringent? What is your thinking?

CARRIGY: Well I think that up until the time that they were, you know, Great Canadian, I don't think we knew what the environmental problems were. The main problem seemed to be the SO₂ emissions that were coming out of the upgrader and there was a whole lot of effort and the environment was to do with the sulphur dioxide emissions. They had monitoring stations and that seemed to be just the environmental problem. There was mention of the tailings ponds, but it wasn't considered to be a big problem, but they were confined within a tailings pond and eventually the land would be reclaimed and it wouldn't be a problem, but the only work was concentrated on the sulphur dioxide. But you never hear any mention of the sulphur dioxide problem now.

PMB: There was all that concern about acid rain at that time, wasn't there?

CARRIGY: Yeah, exactly and so that... Other than that, because it was considered to be a remote area that there wasn't much vegetation and that there was no real concern about disturbing the land because there were still, at that time, permafrost in the ground, it wasn't completely, the permafrost hadn't completely gone out of the ground. So it was kind of a muskeg area as far as most people were concerned, it was not considered to be an environmental problem.

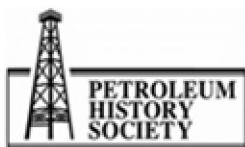
PMB: In your notes you also made the comment that one of the surprises to you was the constant concern by especially the Alberta Government that somehow the Federal Government would move in and take over the oil sands, as they had done prior to 1931.

CARRIGY: Yeah, well the... So I was just new to the area, so I didn't know what had taken place before, so I didn't know the relationship between the Alberta Government and Federal Government, but prior to 1930, it was the Federal Government's responsibility and I think the Alberta Government always thought they had not done enough to promote the oil sands and somehow.

PMB: The Federal Government hadn't done enough?

CARRIGY: Yeah. So the Alberta Government wanted to get in and this is based on what, sort of I gleaned. I wasn't very familiar with things at that time, and so the Federal Government when they turned over the resources to the Province, the Alberta Government started to get more interested in developing the oil sands but there was still this residual feeling that the Federal Government might at any time decide that would develop the oil sands independently without the Alberta Government. And I think Mr. Lougheed probably could elaborate more on that.

PMB: Well we've been talking for an hour and a half and I'm going to thank you very much and I'm going to turn this off unless there's anything you want to say. We have a lot here, but there's still a lot more to talk about.



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CARRIGY: Oh yeah, well I think we haven't touched it, I've just sort of come in and out of the various points but I think it probably would be better if we could somehow develop a coherent picture.

PMB: Well thank you very much, oh, I'm sorry, you're wife's name is it Shelley?

CARRIGY: Shirley.

PMB: S-H-I-R-L-E-Y.

CARRIGY: Yeah. That's by accident; people often think I say Shelley, when I say Shirley, because I don't put the "R" on Shirley.

[END OF RECORDING]



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