JACK SUGGETT

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Name of interviewer: Peter McKenzie-Brown

Name of videographer: Peter Tombrowski

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Initials of Interviewer: PMB

Last name of subject: SUGGETT

PMB: And I'm talking today to Jack Suggett with Suncor, yes?

SUGGETT: No, I'm with Athabasca Oil Corporation.

PMB: The date is the 24th of July, 2013, and we're in one of the Bow Valley Square buildings.

Would you begin by just telling me about your life, just briefly where were you born, where were you educated, what degrees did you get, first jobs and that kind of thing?

SUGGETT: I grew up in Edmonton. I was actually born in Yellowknife, and lived in the Territories for a period of time.

PMB: How did that come to pass?

SUGGETT: My dad was a radio operator, so was doing Morse Code in the North in the early days, and so it'd be the early '60s, and they moved to Edmonton just before.

PMB: Was that part of the DEW Line operation?

SUGGETT: He was earlier involved, or part of the DEW Line. He had a year in a place called Copper Mine in the late '50s, right on the Arctic Coast, and so I don't know how much of the DEW Line he was involved, per se, with but certainly that was a big deal at the time.

PMB: It was Distant Early Warning is what DEW stood for, and the idea was that in case the Russians send any jets or missiles to North America they would have to come over Canada.

SUGGETT: So there was a couple times where he was, I guess, talking to the planes up in the North there. The U.S. planes were flying around there.

So their plan was to land somewhere where I could be in school kind of for an extended period of time in one location, and that's what happened. They actually still own the same home that I grew up in in Edmonton. Still go back there once in a while. It's quite fun.

PMB: Well when did you move to Edmonton, what year?

SUGGETT: That's be '67, I believe.

PMB: '67, and what schools did you go to?

SUGGETT: '66. I went to the Meadowlark Elementary School, and the Hillcrest Junior High, and then the Jasper Place High School. And so that was pretty vanilla, I guess, if you want to call it that. Went through school, and went straight into university, University of Alberta, and straight into engineering. I got into mechanical engineering and my marks weren't the top of the class, so it was good to get in there and get through. I wasn't the gold medal student, that's for sure. But it's worked out well. I mean not everything is about the grades, I guess.

PMB: So you graduated around 1970 or '71?

SUGGETT: No, I graduated from high school in '79, and from university in 1984.

I am 52 right now. I took an extra term; I flunked a couple classes because I was running in track, and actually of highlights in my life, track was one of them.

PMB: What distances, 100 metres?

SUGGETT: 100, 200, 400 metres, yeah. I was the fastest 100-metre runner in Western Canada. So that's one of the reasons I took an extra term was I was training so much that I flunked a couple classes, took an extra term, and still got through, and realized I wasn't going to make the Olympics so I decided well, it's time to get a job and to get to work.

PMB: And where did you go to work?

SUGGETT: I started right out of university at AOSTRA, actually, and I had a --

PMB: Now let's get the dates on this right.

SUGGETT: Yeah.

PMB: So you graduated from university in 1984.

SUGGETT: So I finished, actually, at the end of December in 1983.

PMB: And AOSTRA, really the big tests in that, and the big public demonstration were around 1987, so just a few years later, really.

SUGGETT: Correct. Yeah.

PMB: Okay. Talk about that please, because AOSTRA is a very important turning point. It was a tipping point.

SUGGETT: It certainly was. And so I started with AOSTRA in January of 1984, and I worked for a fellow named Gilbert Cordell, and he was assigned the responsibility of figuring out what the reservoir process was going to look like because, of course, Roger Butler had come up with the Steam Assisted Gravity Drainage Concept, and AOSTRA decided that they were going to put in the Underground Test Facility somewhere in about that period of time, and so I spent the first couple years just doing reservoir simulation. And I actually was the first person, as a junior engineer, to successfully use a numerical simulator to model the SAGD process. So that was quite a highlight for me, looking back.

PMB: Now, before we leave that, will you be coming back to that idea in a while, or do you want to develop that now? What is a numerical simulator? And now in those days, as I recall, you had 286 computers and these really ancient models of a personal computer.

SUGGETT: So we actually weren't using the personal computers of any sort. We were using modems from AOSTRA's downtown office, which is in the current ERCB building now; we had the 10th floor there. And we were using modems to log into the Honeywell computers at the U of C' and they had four machines there.

PMB: So they were the big computers that had to be in environmentally controlled environment; temperature control and all that kind of stuff?

SUGGETT: I would suspect at the time they were. I never actually saw those computers. It was remote login. We were just past the point where programming was done with cards; you did it on a local station, and were able to log in. And the computer modelling group had come up with a computer model called ISCOM, which is the precursor to STARS. That model was, again, the precursor to STARS which is quite routinely used in town now, but it was an older version. And we would spend hours of computer time doing SAGD runs and that, because obviously they were slower than you can do now; very labour intensive. All paper printouts, you didn't have the graphing capability, et cetera, that we do now.

Numerical simulation is basically using grid blocks, and a matrix solver will figure out the flow rates, the temperatures, the pressures and that thing, so it was a pretty sophisticated model for the time.

I know that once I had successfully gotten the model to do SAGD, my boss's boss immediately sent me up to the U of C to meet with Roger Butler and show him the work we were doing. And, of course, Roger was interested, but he was more interested in showing me his analytical models which were pretty good, too, and we were getting pretty good matches between the two. But, again, we did not have any ground data, so to speak, any field data to ground the model to. So it was all theoretical at the time.

PMB: Now a couple of weeks ago I interviewed somebody who was actually Roger Butler's boss at Imperial around that time, and he said Roger told him all about this idea, and he said Roger, you're crazy. That'll never work, that is the idea about SAGD.

What I find odd here is that well before the tests began AOSTRA was doing some modelling for this. And then Roger, by this time was he at the University of Calgary as a professor?

SUGGETT: Yes. Yeah.

PMB: And so he was doing some additional modelling. How did that happen? How did it happen that AOSTRA was modelling the SAGD idea long before it had been "proved"?

SUGGETT: Well, Roger, of course, developed the process when he was with Imperial, and then he went to the University of Calgary, and there he got funding from AOSTRA. So AOSTRA, one of the big things that they did, was produce people who knew about oil sands, and they did that a couple ways; they hired them and trained them in-house, and they also put a lot of money into the universities. And so professors could get grad students to, of course, work on those projects, and that's what Roger did was work on projects for AOSTRA.

The way AOSTRA put their money out was they put a lot into the universities, and then they put a lot into projects that they would cosponsor through the operating companies, and that was their primary mechanism for developing the technology was to let an oil company come to them with a proposal for a project, and then AOSTRA would fund often 50 percent of those projects.

But the university funding program they had was very big as well, and every year they would gather all the professors that they had, and some of their grad students, and there was a few years in a row we went out to Banff, and we'd spend a couple days just going over all the research work that had been done, and the developments that had come along. So that was very beneficial to the oil sands.

And if you look at the people who are in the industry now, a lot of them have come through those university programs, or have been employees of AOSTRA, like myself. And there's quite a number of them that are in senior positions in CNRL, Cenovus, those places.

PMB: So would you continue with this really important involvement with AOSTRA and with the original development of SAGD. I've asked you to kind of talk about your career, would you continue from there?

SUGGETT: So I just talked a bit about the reservoir engineering piece that I did, and that was as a junior engineer, but I was just very fortunate to be in the right place at the right time, working on the SAGD stuff.

I got involved fairly shortly after that in they call it a geotechnical program, but it was a monitoring program for the first field test: a lot of temperature and pressure and heave information that we worked on. One of the highlights for me was a spring bus ride up to the Underground Test Facility before there was any mine there; they were drilling the first shafts and so the road had just been put in. I think that was 1985, I guess, they put the road in. And we went up there and we saw the triple drilling rig that they brought in out of the States, and on the ground was laying the 250,000-pound bit that they would drill the shafts with. So that was pretty exciting to even be part of that, and to be able to go along for the ride, so to speak.

Anyways, so I guess after the reservoir engineering stint, I started working on this geotechnical program quite a bit, and that rolled into the Phase A test at the Underground Test Facility. And by that time we had a rig that had been developed for drilling those wells. They had tested it out at Exshaw, and they'd taken it apart, and they took the rig up to the Underground Test Facility; and it went down the shafts in I believe it was 16 pieces, then they reassembled it underground. And they literally drove it down the tunnels. It's all electric, so it was an electric hydraulic rig. They drove it down, they set up, and they drilled the holes.

We had a lot of trouble drilling those first wells. There's about 150 metres long of which only 50 metres was the reservoir part of the well. But despite all the challenges, Phase A started up in late 1987, and we steamed those wells, and we were surprised a bit by some of the geology, but despite that, the oil came out at rates higher than we expected. And so that was the impetus for saying look, we've got to go to the next phase, and what does that look like?

So the team started working on UTF Phase B, and trying to convince the industry partners to start coming along. Of course, some of them had come along with the Phase A work that we had done, but there was more getting added as time went on.

It's probably worth a little deviation just to talk about the partners because ultimately I think they had nine shares in the Underground Test Facility that various industry companies joined in on it. So that was very different than the other models that AOSTRA had had, and typically if industry came forward with a project, it was deemed the right thing to do, and AOSTRA should therefore support that project.

The Underground Test Facility was something very different, and I believe all the credit really needs to go back to a fellow named Maurice Carage (phonetic).

I've met Maurice a few times, but from all that I could gather, he was the one within AOSTRA that believed in this concept, and pushed it, and ultimately look at the difference it's made for the province because of one guy deciding that this is the way to go. Now we're not using underground mines anymore, but certainly the SAGD process, in my mind, would have been delayed at least ten

years more had we started from surface because of the complexities of producing oil up a well rather than into a tunnel, when you're trying to run a process that needs to be very stable, and handled very gently.

PMB: Now, at the time that you actually created the tunnel, if I'm not mistaken, the technology to actually drill a parallel, horizontal wells really didn't exist to do it from the surface.

SUGGETT: It did not exist. In fact, even technology for drilling horizontal wells, period, from surface, even, was in its infancy. There was not really any wells that had been done horizontal. A lot of deviated well drilling was starting to go out, and long-reach wells were starting to be proven up, but the technology for drilling two wells that close together was not there. And so, again, you wouldn't have been able to drill the wells from surface like we did from underground. And the technology for putting those wells close together, of course, has advanced by light years since that time. It doesn't look anything like what we were doing, but we were demonstrating the need for technology to do it, and that did develop as time went on.

PMB: And then after the big demonstrations, which were in '87 a lot of people came and were astounded, and then they it was another ten years or something of experimentation done from the Underground Test Facility; is that correct?

SUGGETT: So the first steaming of the Phase A well started in late '87, and it wouldn't have been until the early '90s that we got the Phase B wells installed, and that was also a budget crunch time in the Alberta government, so there was a one-year delay on getting the Phase B project to move ahead, which it eventually did. And we got it started up on the first facilities, got the new facilities built, and got the wells running quite well in '82/'83 type timeframe, and I left AOSTRA in 1994. So things were well along on that project by that time.

PMB: And there was a lot of excitement. And it was at that time that it was JACOS and Encana, or Cenovus. Weren't those the two companies that first developed SAGD pilot projects?

SUGGETT: Outside of AOSTRA you mean?

PMB: Yeah. In other words, the first commercial projects, or the first private projects were done, I think it was Cenovus was the first one. And I think JACOS, the Japanese/Canada oil sands.

SUGGETT: JACOS were running pilots for many years, so they never really got going into the commercial realm that quickly.

PMB: Until fairly recently.

SUGGETT: At the time PanCanadian were the ones who approved the Christina Lake Project.

PMB: And they became Encana.

SUGGETT: They did. And at the same time Alberta Energy Company was working on their Foster Creek Project, and so the PanCanadian, AEC companies merged and became Encana, and then ultimately the gas piece split off of Encana, and Cenovus is the one left with the Foster Creek and Christina Lake Projects.

The Christina Lake Project, though, the history of that one is that there was a parcel of land at Christina Lake put up for bid, and the company I was with after AOSTRA was CS Resources, and we were working on the Senlac Project at the time, a project in the Lloydminster sands, south of Lloydminster, the Dina Sands, and it was one of the earlier projects with two wells from surface for the SAGD. There'd been others that Esso, I believe, had played around with that a bit. Shell had done a project, CNRL -- well, it was AMICO, I guess, was playing around at the time. Probably "playing around" is the wrong term, but all these companies were doing pilots on this stuff. And CS Resources decided to bid on this piece of land, and they got the Christina Lake lease for I think it was something like $2.4 million. It was ridiculously small value, but you have to remember that oil --

PMB: How big a parcel of land was that?

SUGGETT: I don't remember the acreage, but about 3 billion barrels were what's on that lease, so quite a coo to pull that out.

I understand from some fairly reliable sources that the company that had asked for Christina Lake lease to be posted was Imperial, and they did not get it by a whisper, CS Resources got it.

And so I was working on some other SAGD projects at CS Resources, and then this came into the mix, and myself and my boss at the time, a fellow named Mark Montemurro, and a couple other folks, we went up there, and we flew over the lease and had a look at what was there, and there was hardly any wells; it was a green field site, there was no road into it. And so that was the start of, okay, what do we do with this piece of property? And so we started to figure out what it would look like.

PMB: I have to tell you a story that somebody from Imperial told me. That CS Resources got that property for a tiny, tiny, tiny bit over their bid.

SUGGETT: Yes, I know that.

PMB: After that, Imperial went into the meeting rooms where the landmen had held their meeting, and they had a bug detector go in there and just search to see whether there were any bugs in that room, because it was so close that they were sure that you guys had gone in and done some industrial espionage for that property.

SUGGETT: As far as I know that didn't happen.

PMB: They didn't find any.

SUGGETT: The way I heard it on our end, because I wasn't involved in setting the price. The geologists had put their heads together and worked up the price, and then the President, Dennis Sharp, came in the room, and of course a small company, the President's going to have a say in what we put in for a price, and he looked over the shoulders of these guys and then he randomly took, and added a dollar value to what their recommendation was from what his gut feel was, what it was going to take to make sure we got that. Because he could see so much upside if we got our hands on it, and the rest is history I guess.

So it worked out well for me because I got to work on that project. And then, of course, CS Resources got bought by PanCanadian, and PanCanadian had the wherewithal to go forward with the pilot project. It took quite a while for everything to progress because you've got to figure out what does the reservoir look like, drill some more strat wells, get the regulatory submission together, put that in.

The application that we put in was for a 70,000 barrel-a-day project which, of course, was the biggest project submitted up to that point, and the ERCB actually asked PanCanadian if they wanted to go to hearing or not, and the decision was that we would, and the reason was was there was a coalmine in Northern Alberta that had been given regulatory approval, and then had had that pulled back. And so they felt that if we actually went through the hearing process, it would be less likely that something like that could happen.

So it was in, I don't know, 2000, 2001 where that project was ultimately approved, and then we went ahead and built the Christina Lake Phase A, which is a facility designed to handle up to 10,000 barrels a day of bitumen.

PMB: I heard you say 10,000 barrels a day just now, but then you said it was --

SUGGETT: 70,000.

PMB: -- the proposal was for 70. What happened?

SUGGETT: So we had put in a submission to do the project in three phases; Christine Lake Phase A, B, and C, and so 70,000 followed by two 30,000 barrel phases. We wanted to get in there and figure out what the reservoir looked -- because every SAGD reservoir seems to do something a little bit different, and you have to be very careful or you'll spend money too fast, and you'll have a bunch of capital sitting there not making oil.

PMB: What else you would like to say about Christina Lake, because that is quite a huge project these days.

SUGGETT: So I was involved right through the startup and operation, and the first couple years of that project running. I'm pretty pleased now that the team that's taken it over -- I know many of the fellows that are still on that team, and the project recently went over 100,000 barrels a day, so that's pretty exciting to have been part of the early stages of that.

PMB: You also mentioned a couple of other projects that were quite important, Senlac, Foster Creek, and Narrows Lake. Those are three additional projects. What would you like to say about your involvement in those three important projects?

Narrows Lake, I think, is the least well known of the three.

SUGGETT: The Underground Test Facility was certainly the segue into the rest of the industry for me, but it was the first company I'd worked for that was an actual oil company. A lot of people thought that AOSTRA shouldn't be running a project, so it was very good to get on with CS Resources. I was working for Neil Edmunds at the time, but my role was basically everything from the wellhead up I was responsible for getting done. So worked with the people to do the public relations to get the regulatory application together and submit it, worked on the water source for the steam generators, and through Sask Water. The regulatory application; we had a consultant in town work on that.

But again I was kind of handling all of that. And it wasn't done in a way that a company would do it today. There was basically only myself in the company responsible for a lot of that stuff, a few other part-time folks, and we used all consultants, whereas most companies will bring a lot of that expertise in-house now. So it was a very, very challenging couple of years while we were working through all of that.

What I was most pleased about was at the end of it we managed to take, albeit a small 5000 barrel-a-day SAGD facility, and from the time we hired the engineering company until we had first steam was only 14 months, and that included getting the regulatory application. And the regulatory application was in Saskatchewan; I don't know if it's changed, but it certainly isn't what it is here. We had a checklist of all the things we needed to address and apply for. We went through that, made sure we'd done everything, and we submitted a relatively thin little document, but it addressed all their questions, and I was expecting to get questions back, and we didn't get that. In six weeks a letter shows up, addressed to me, and basically said here's your regulatory approval for the project.

So it's, again, a testament a bit to how things are done in Saskatchewan, and I don't know if they still can do stuff that fast, but it wasn't kind of a big project that was going to get lots and lots of scrutiny.

PMB: What was the size of the project?

SUGGETT: It was about 5000 barrels a day.

PMB: 5000 barrels a day, and the cost?

SUGGETT: It was slightly over 30, say $31 million, in that ballpark.

PMB: And, of course, in today's world that would be kind of peanuts, wouldn't it?

SUGGETT: Yeah, you'd never be able to do that anymore; the factors that go with construction, and that sort of thing. You have to realize though at the time the industry was still pretty slow. You know, the takeoff for oil prices going from 20 to 40 to 60 and onwards hadn't started yet, so funds were pretty tough to dole out. You were very careful and --

PMB: (Indiscernible) was actually building a project based on $20 oil?

SUGGETT: Yes.

PMB: Which would be hugely profitable today.

SUGGETT: Hugely profitable. So actually that project - I believe it's in public record - that project was ultimately sold by Encana and Southern Pacific, I believe, bought it for $90 million or so. So there's no way that they put even half that much money into it while they owned it. It was great, yeah.

So yeah, that one was really, for my career, made a big change in what I was doing on projects because that was the first one where I was kind of responsible for a whole bunch of stuff on a project, and gave me exposure to all sorts of things, which was a really good lead into the Christina Lake Project.

And there was a couple other little projects that we worked on along the way that didn't take off, for whatever reason. I've been involved in the design of about seven SAGD projects, and only a couple of them got built. So that's just the way it is. You're going to get some that go, some that don't.

So anyways, Christina Lake came after, and my role was that of the kind of lead facilities engineer. But one of the things that I brought to the table was the reservoir experience, and a lot of reservoir and some drilling exposure, so it was a good fit for me just to kind of make sure all the technical tie-ins were done well between the different disciplines on the projects. That's one of the things I really enjoyed about working on Christina Lake was having that kind of influence on the project, if you will. It was terrific.

PMB: Now, in the notes that you sent me you mentioned that you're involved with Athabasca oil sands companies, so your present employers. Leduc Carbonate Project. Now, I know that the original Leduc discovery was in a carbonate, but it's still a light oil?

SUGGETT: No.

PMB: Okay, is this oil sands or heavy oil related because I always think those carbonates as mostly being associated with lighter oils.

SUGGETT: So the Leduc Project that I'm currently working on here, and my role - I guess I should clarify a little - since coming to Athabasca I don't work full time anymore, so my title is Senior Technical Advisor; and I'm working on the Leduc Carbonates. I wanted to work on it once I found

out that they had this project, and what intrigued me was it's still bitumen in the sense that this stuff does not flow at room temperature. So it is the Leduc carbonate rock. It's a little better than the rock down by Edmonton at the original Leduc discovery, but it's not light oil, so it doesn't flow out of the reservoir when you put a well in it. You've got to heat the bitumen in that reservoir.

PMB: Okay, in terms of API what would it be?

SUGGETT: It would be in the 4 to 6, 7 API range.

PMB: Really?

SUGGETT: Yeah, it's very heavy stuff.

PMB: Okay, so it is bitumen?

SUGGETT: At least as heavy as bitumen. It is bitumen, for all intents and purposes.

Well, that's one of the things that intrigued me because I had the opportunity to be one of the first guys on SAGD, and now we've got this Leduc and we're developing it hopefully with a process called TAGD, which is Thermal Assisted Gravity Drainage, and this uses electrical conduction heating instead of steam in the reservoir.

So the challenges with the carbonates are that the porosity of the formation is about half what the sands are. So I mean the sand reservoir is basically just beach sand full of oil. In this case it's more like a limestone rock you'd see out at the mountains, with lots of vugs in it, and ours has vugs and fractures in it. And so this was the next nut to crack, if you will.

And, of course, people are working on the Grosmont carbonates which there is lots of that in Alberta, and there's the Leduc carbonate piece. I believe we're the only ones with a substantial chunk of that. And to develop that there's about a 17-billion-barrel carrot there for our companies to figure out a viable technology.

PMB: You talked about Thermal Assisted Gravity Drainage as one of the technologies. Are you using anything along the lines of fraccing as part of that process or not?

SUGGETT: No.

PMB: So how does this work exactly?

SUGGETT: We drill a number of horizontal wells into the reservoir. So rather than having a well pair, like SAGD would have where you inject steam in one well, we still put a production well at the bottom of the reservoir, but we put a number of horizontal wells above that, and we just do pure conduction heating using electrical power. And if you do small wells, and you can do them long enough, it looks like the economics are going to be favourable.

PMB: Now I talked to somebody about that fairly recently, and he told me that there were a lot of problems with using electricity because you'd lose the current into underground water reservoirs, and all of those kinds of problems. Not a problem here?

SUGGETT: We don't have a process that is putting current into the reservoir, all we're doing is heating a heater made up of cables that's situated in a well. So we make that well very, very hot, and just conduct heat out from that. Many of the processes you're talking about, they're actually putting current between wells and the reservoir, and we're not doing that.

PMB: Now, about five years ago, as I recall, Shell was doing something similar; they were taking an electric heater, and sticking it down in a well, and I kind of think these were vertical wells, and I believe they might have even been in the Peace River deposit. Do you know anything about that, and is this in any way similar?

SUGGETT: It is somewhat similar. Athabasca Oil Corporation has a technology agreement to work with Shell basically, and we've got some of the people that worked on that project that you're talking about that are currently at Athabasca. So we haven't gone into this blind. We've picked up some talent that we believe will help move us along fairly quickly on the development of this technology.

To date we have a field test that was put in, and has done very well. I can't talk too much about that, but it's performed very well. We've deemed it a success, and our next step is to move on and do a pilot project and then a demonstration project.

PMB: And you just take electricity from the grid?

SUGGETT: Well, you can take electricity from the grid or you can generate it yourself onsite. There are some synergies if you want to do it with a cogeneration and a SAGD plant nearby you could make steam and power together.

PMB: Well, I'm really glad I asked that question. That's very important.

SUGGETT: The TAGD stuff's pretty exciting, and in my opinion it's viable, and I think it's going to be one of the next things that work very, very well for this type of reservoir, and I think once we've figured out for that, you'll even see it have application in the sand reservoirs.

PMB: There was some talk about building a nuclear generator in the province because it's safe --

SUGGETT: To make electricity.

PMB: -- and it makes electricity available fairly inexpensively, relative to gas-fired or coal-fired, with less pollution. I think those were the main arguments. It seems to have died, the whole concept.

SUGGETT: There's some people still poking around with that, the idea of making steam and/or electricity with nuclear. Athabasca participated in an industry project where we looked at that, and one of the biggest problems with that is you're probably looking at at least 20, if not 30 years out in order to land a project in Alberta of the technology that would work for making steam. So that's probably the biggest holdup of getting something to go. The regulatory process take years and years.

PMB: That covers an awful lot of the initial stuff that I wanted to ask you about. Now I'm going to revert to these questions, and you're doing exactly what I need. You're giving me a lot of very helpful, interesting, and easy to understand information about this.

Let's go back a little bit. When did you first hear about the oil sands?

SUGGETT: Sometime in school probably, but I didn't know much about it, and didn't have a lot of interest in it. I got into the oil patch with a summer job in Wainwright through AOSTRA; they hired me as a summer student, and I went to work actually for Petro-Canada, but funded by AOSTRA. And then after those four months I went back to school for four months, and then after that got on with AOSTRA on a temporary basis.

PMB: What were you doing in Wainwright?

SUGGETT: It was a Fireflood Project, and so I was doing a few reports and studies for them out there, and covering as a backup operator, if you will, for vacation. And while we were there the plant was actually deemed to have gone sour, so you had to have two operators on all the time, and so I was the second operator for a period of time. So it was typical summer job; do a couple studies, submit a report which went to AOSTRA.

PMB: Now with almost 30 years of experience now behind you what is your appreciation of fireflood and other fire-ignition-related techniques? I remember I worked for Gulf in those days and we tried fireflood and didn't have a hell of a lot of success.

SUGGETT: Well, fireflood didn't work well, steam floods work only in select reservoirs, steam drive, same thing. The problem with the bitumen reservoirs is that the bitumen doesn't move, and so you start pushing steam in and what happens is it will short-circuit to somewhere; maybe there's a water lens somewhere or -- but anyways that steam is lost. And that's the beauty of the SAGD Project is it's so gentle that all you're using is gravity, and gravity, of course, is a very strong force. And so fireflood, steam drive, those processes were never very efficient because they were losing their energy to other locations. So there's very select reservoirs where they work, but the bitumen is not one of them.

PMB: I think that it was Neil Edmunds who told me that they thought that the pressure of the steam would drive the bitumen, and they realized that it had nothing to do with it, it was the gravity. It was gravity that was making these things work when they did work, but it was not the pressure of the steam.

SUGGETT: No, I would fully concur with Neil. In fact, I worked in the same office space four different times with Neil. He was my boss at CS Resources, hired me out of AOSTRA to go there, so Neil's a good acquaintance, good friend.

PMB: I'm trying to remember whether you were around during the National Energy Program?

SUGGETT: Yes, but I was very --

PMB: You were pretty junior then.

SUGGETT: -- junior. But in some ways I was very fortunate to be on the Underground Test Facility because that project, the Phase A Project was going ahead, and so we were feverishly working on landing that project, and getting it operating, and then running it for a couple years.

And so in 1986 they brought in that program and, of course, there was layoffs all through Calgary, and I was isolated from that, so certainly was pleased to be where I was. AOSTRA did not pay very well, but what you got out of AOSTRA was your education in terms of post-graduate work experience, and that was first class.

PMB: Any general commentary on that period of Edmonton/Ottawa relationships? You were kind of in the government, but --

SUGGETT: Too young to really have understood it, yeah.

PMB: Okay. And then the follow up to that and, of course, once again you were isolated from this because when oil prices collapsed in, when was it, '86, you were just getting ready to demonstrate the first two horizontal wells. So once again you were completely isolated from that.

SUGGETT: Yeah, there was a couple different times where there was substantial price drops.

PMB: And then in the '90s, '97 --

SUGGETT: In the '90s there was -- '97 there was one too.

PMB: -- 10 or $12 a barrel oil.

SUGGETT: Yeah. And so I guess, you know, the first time I was on the Underground Test Facility was very fortunate that I was there, and the second time around we had just built the Senlac Project. So once you've got a project landed you have to have people to run it, and these big projects, the SAGD projections, you don't turn them off at a whim. You have to have very good reason, and a belief that you're going to lose money for a very long time because you're still going to lose money with it not operating. All of these projects have always continued to go. What they might do is hold back on funding of future phases until cashflow improves but that's, of course, one of the good

things if can find yourself in the position of being a key team member, you get some security through that.

I know in the late '90s PanCanadian did a substantial layoff, and it happened very quick, very fast, and I survived that, but one fellow in our group was let go. Just they were looking for numbers. They didn't care how it was done.

PMB: I talked to somebody who worked at Petro-Canada who told me that the staff after the '86 collapse, I think, the reduction in staff reduced the size of the company I think he said from 12,000 to 4,000.

SUGGETT: I don't know those numbers, but I wouldn't be surprised.

PMB: It was just fast. And part of that, of course, was that the Mulroney government wanted to turn it into a private company so they needed to slim it down.

You've kind of described a lot of this stuff, but let's put the question to you personally. The question here is what were the main achievements or highlights of your involvement with the oil sands? And you've talked a lot about that over the last little bit, but would you just make that a personal statement and talk about it? What are your main contributions?

SUGGETT: There's two or three of them. I think the main one was that I was fortunate to be able to be a part of the team that did the Underground Test Facility. I was right out of school when I started working on the reservoir process. When I left AOSTRA my title was the Coordinator of Engineering for the Underground Test Facility, so I reported to the Project Manager. There was a couple other guys at my level doing other parts of it, but it was just very fun to have worked up and been a key part of kind of the first serious SAGD Project that demonstrated the technology.

And then to have actually had lead roles on the Senlac and Christina Lake Projects, to me, I look back and say those were highlights because there's so much siloing of the jobs anymore that you find very few people that understand all aspects of these projects. And I was fortunate to have been given the opportunity at AOSTRA, through the fellow named Jack Hasson (phonetic). He worked me in a bunch of areas, and then at CS Resources Neil Edmunds gave me a lot of responsibility. At Christina Lake, again, I reported to the project manager who wasn't a very strong technical guy in terms of the oil sands technology, so I was there with a lot of stroke, a lot of authority to have my thumbprint, if you will, on those projects.

PMB: Sorry, what company was that?

SUGGETT: At PanCanadian. So when we did Christina Lake PanCanadian is the ones who initially kicked that off, and to have a senior role, I mean that project had my influence all over it. And that's exciting when you look back on a career to actually be able to say, hey, I had a key part of that. And the guys who are there still, they know who I am. It's interesting, yeah.

PMB: I've mentioned the NEP, and I've mentioned the oil price crisis, the two that happened but were there any other crises that affected your involvement? And I'm thinking of some of the projects they've had, for example, explosions, like the Joslyn Project a few years ago, or any major kind of disasters like that?

SUGGETT: The biggest hiccup that I was involved with was at the Senlac Project when the first three well pairs -- we didn't have as good a understanding of interaction of the reservoir and sand control as we should have, and we lost pretty much --

PMB: Reservoir and sand control.

SUGGETT: So the wells that are in the reservoir have got sand control so the sand doesn't come into the wells and get produced. If you're a little too rough with those wells in terms of injection rates, or production rates, you can break down that sand control, and once you have sand in the wells you've got a problem because it doesn't flow very well to get it out of the wells.

So on Senlac, the first three well pairs, we had a lot of sand production and a lot of learnings. It wasn't until they went to the next phase that they really demonstrated how good that reservoir was, and that you could make oil consistently, and at very, very high rates.

PMB: So did you have to abandon the first three well pairs or were you able to fix them?

SUGGETT: In hindsight we should have, and I think Neil would probably concur with that. The first thing we should have done was just redrilled those wells, even in between what we had, and started over at that location, or gone to a new location.

PMB: What kind of technology do you use to control sand in a case like that? I thought you had very tiny little slots in the well bore that the steam went through and the oil came in.

SUGGETT: Yeah, there's a number of technologies. That is, of course, what most companies or all companies really are using now is they cut slots, very fine slots, and they actually roll them. The technology around that's a science unto itself; it's fascinating.

We had things that MeshRite filter, so it's basically a steel wool that's encased in the well, will stop sand. Wire-wrapped screens in there, again with very small gaps, so things like that. For sure, you can't have the quarter-inch holes that you would have in primary heavy oil where the oil is still viscous enough to carry the sand; it's not going to happen in SAGD sand. Sand needs to be left in the reservoir. The tricky part is you need to make sure you don't plug up the reservoir by getting clay in those sand grains and stopping the oil from being produced. So you've got to have enough of a gap to produce the oil, but not too small to plug up.

PMB: There's one question that nobody has explained to me properly, and I know this is true. I know that every grain of sand in the oil sands has a little layer of water around it, and then on top of

that, of course, is the bitumen. So my question is this: Why is that little tiny, tiny, tiny little layer of water so essential to extracting the oil from the sand?

SUGGETT: I don't know that it's essential to have it, it happens to be there, and that's just part of what there is.

PMB: So maybe the issue that I'm dealing with is that when you use the hot water process to extract the oil, then it's really valuable, but not to produce it from the field.

SUGGETT: No.

PMB: So maybe that's the question that I really should be asking.

SUGGETT: Yeah, there's a connate water volume that is there; it's water that can't be produced from the reservoir. So there is some water that doesn't get produced. And so in the reservoir simulators they actually have that left in there. Of course, even when you inject steam some of it gets left behind, and there's lots of theories on where that water gets left behind. Usually the number is 10 or 12 percent of the steam injected doesn't get produced. In situ water is a complex story.

PMB: Well, I was thinking of the little bit that's wrapped around the oil sands, but that probably has to do with the separation, the hot water separation process which is really part of the mining of the mineable oil sands.

You told me a few minutes ago that you're not working for Athabasca actually, you're coming in here as a consultant.

SUGGETT: No, I'm full time with Athabasca.

PMB: Okay, what did I misunderstand?

SUGGETT: I told you that I don't work full time, but on paper my arrangement with Athabasca is full time, but I have more vacation than someone else. They're the only company I work for.

It's a rather unusual arrangement, but I know a few people in the industry are getting arrangements like this. I mean as some of us get older, less interested in the money, and more interested in time.

PMB: I do want to ask you about the Thermal Recovery Water Management Group that you were a founding member of, and that sounds to me as though it's a fairly important issue.

SUGGETT: Well certainly water is a big, big issue. If you think about these SAGD plants, they're more water management than they are oil management. I mean the whole deal with taking water from a source somewhere, making steam, putting it in the reservoir, taking that produced water and recycling it, and bringing it back around so that you can use it over and over and over is very

important. And probably three-quarters, if not more, of the cost of a SAGD plant is in the water. And that's one of the benefits of this other technology I'm working on with TAGD is that it doesn't have water, we just heat the oil conduction wise. So the fellow who organized a few of us to get it started, his name was Dave Theriault. I believe we've interviewed him.

SUGGETT: Okay. I didn't see his name on the list but he would have been someone you should have interviewed. And he was with Laricina, and I don't know what he's doing now; he's not there now.

So anyways, Dave got this group going. Dave didn't stay with it very long, he went on to work on some other things. But I had the good fortune of being able to stay on with that group. And so it evolved as time went on. We had arrangements where a little bit of funds were put in. We had a contract coordinator for the group, but somebody who was very technical in the water world, and that guy ran the group for 14, 15 years until recently we decided that --

PMB: What was his name?

SUGGETT: Ed Hoffman. So Ed decided that he was going to kind of more fully retire at that time. He had been originally with Shell, and he went consulting back when all the layoffs -- Shell did the layoffs of everyone 49 and older. Can you imagine the knowledge that walked out the door that day? But anyways.

So Ed coordinated this group, and over the years worked on a few projects, but the primary thing was technology exchange between various companies.

PMB: And that was going to be my next question. So water, it's an environmental issue mostly. But, of course, it's also an industrial problem. And so this would be an organization where you said, here's what we do. How do you do it?

SUGGETT: Yes. So it was very informal. What we did was we made sure it was only operating companies that were in charge of the direction of the group. We would periodically invite vendors in to talk about what they had as a product, but then they were excused. And every company would take their turn doing presentations on technology that they're working on. So it had to be collaborative. You had to go in with the idea that you weren't going to be holding stuff back.

The whole idea around the water is everybody has something to gain by knowing what the other guy is doing, and much less so to gain by being secretive, and that was the premise behind that group. And we managed to run that group for 15 years with just a couple of guideline pages of how we did business. We didn't have contracts that companies joining would have to catch up on some of the funding. And we probably didn't run it quite the way you should run it, and currently the group has changed; it's got a small board, and it's a little nonprofit group, and it continues to do pretty much the same thing technically that it did for years without that.

PMB: So it wasn't affected with the creation of, do you remember OSLI?

SUGGETT: No.

PMB: It was not affected by that at all?

SUGGETT: No. No, this was something totally separate. We managed to keep it out of getting formalized, or too -- I don't know what the right term would be. The technical people decided what the group would do, and it was very informal. I think that was the trick to why it was quite good, and people who'd go there to these monthly meetings, there's always something you'll learn.

PMB: Now the whole question of water, I'd like you to talk about that. First of all, why it is a hugely important issue, and partly it's environmental. But, of course, part of what you do is to bring up produced water from brackish reservoirs down in the ground, and then use the water, and then reinject it. There's a certain amount of water that actually comes from rivers and lakes and that kind of thing. What are the different management processes for the different kinds of water recovery, and management?

SUGGETT: This is a very, very big topic. And kind of what I've seen is the surface water is probably not water you really want to use. There's a lot of variability season to season, and that's why -- when we worked on Christina Lake, we were in a local freshwater (indiscernible) very, very big.

PMB: So you didn't take water out of the lake?

SUGGETT: We didn't take water out of the lake. It was one of the items on the list that was a source, but nothing else was local. You couldn't get brackish water right close at hand in good supply, so we started out using that. And, of course, the pressure has been from the regulators and the environmental folks is to go to these more brackish sources because it's deemed that sometime, somewhere, somebody might want to use those freshwater sources, despite the fact that nobody is using them other than the oil companies.

The push continues to be how far can you go into the brackish world? And it continues to add cost to the projects, but it also is continuing to get technology improved, and as time goes on I expect that's only going to keep progressing in that direction. So I guess as a snapshot that's probably as best you can do.

The technology for using freshwater is much simpler. The recycling of water they've actually shown is, to a degree, less expensive than sourcing water from a lake and aquifer for anywhere else. It is there. It's when you start to get it concentrated, and the salinity starts going up, then what do you do? And that's where it starts to get more expensive at the back end of that.

PMB: And then the problem is how do you dispose of it. So in effect you're taking freshwater, you're using and reusing it, and then it gradually becomes more saline?

SUGGETT: Well that's what we were doing. So we were using freshwater, but most of the projects now are using a saline source to begin with, and they're making it more saline, and having to dispose of that once it's --

PMB: So they're disposing of something which is a lot kind of dirtier or more concentrated, I suppose.

SUGGETT: Yeah, it's more concentrated. You get to a point where you can't dispose of it, though, and in those cases they're actually getting a sludge that can be landfill.

So I mean the plethora of technologies that continue to be developed on this is outstanding. I actually had the good fortune of working on a project that was very successful in terms of using water better in -- once through steam generators, which is kind of the garbage boiler of the industry. You can put in water that's got some TDS (Total Dissolved Solids) in there. So the TDS can go through these boilers, and you're limited to about 80 percent quality, meaning that of the water that goes in 80 percent of it is turned to steam, and the other 20 percent stays as water, and comes out the back end. And in early projects we were disposing of that into disposal wells. There's a lot of technology been worked of how we are more efficient about recycling that blowdown.

I concocted this idea that why don't we just run it through another steam generator and see what happens with zero treating. And at Encana, now Cenovus, worked on a project where we ran it for about six months and turned out very successful. So that's one of the key technology pieces in their mix that I'm pretty pleased to have worked on.

So I had a couple years as the Facilities R&D Coordinator at Cenovus. So that was very fun too because you see a lot of the neat stuff.

PMB: Role of government in oil sands development; has it been supportive? Has the regulation been effective? Should it be more stringent? I recently read this new history of the Energy Regulator, what used to be called the ERCB. And I'm quite impressed with that but, of course, the oil sands have only been recently a part of their work.

SUGGETT: My impression is that -- I mean I'll come back to the story I had about the Senlac Project. We had a checklist that we needed to deal with; we went through that checklist, and we submitted a very small application, and six weeks later we got project approval in the mail, no questions asked because we'd addressed everything, and they found it to be complete.

Now in Alberta you'll -- and the original applications for pilots were quite small. Commercial projects would have been bigger. These continue to get bigger and bigger, and most of them are volumes of the environmental baselining, and so that's probably really good stuff. But the fact that projects can require two and a half to three years to get approval means that a company has to start -- to prepare a regulatory application of that complexity takes probably a minimum of a year and a half to two years, and then you add on top of that the time it takes to get the approval, and you can't

turn a plow until you've the regulatory approvals, the lead time to when you can start building, and then you've got another couple, three years.

I don't know what the way around that is. Certainly making one body that actually functions as one body should be an improvement. Whether internal to the government, they actually get rid of those internal turf wars, I have no idea if they'll be successful doing that. So I would be worried that we're not going to see things get better for a while yet.

PMB: In terms of reduced regulation?

SUGGETT: Right.

PMB: One of the things that I recall from my work in the CPA, Canadian Petroleum Association, is that it used to be a fairly simple matter to become very rich in the Canadian oil industry. You'd have half a million dollars, or a million dollars, and you get a few people to put that together, you drill a successful gas well, you tie it into the local infrastructure, and then you'd have revenue, and you would start. So many very successful companies - CS Resources is a great example - started with a very small amount of capital.

What is happening now with the oil sands is kind of that whole thing turned on its head. Very successful companies are forming, but it's taking huge amounts of money to get started. I think the average oil sands company, producing company, is worth billions of dollars. But maybe it takes a billion dollars or so to get started. How would you explain that?

SUGGETT: Oil sands is not the game for the little guys. You've got to be prepared for the long haul to really get in, and like I say, take that big lead time. So you've got to have investors that realize at the end of the day they might make quite a bit of money and multiples on their money, but it's going to tie up their money for years. And Athabasca is a good example. I know there is a lot of those early investors; some of them have left and made some money. But to build a company and grow it to where you've got your own production takes a very long time, and particularly around bitumen. Bitumen projects, the cycle time to get production going is long.

PMB: But there is an irony in this, and this is something that Neil Edmunds told me when I interviewed him, that while it's expensive to get started, once you do get started the stuff is very cheap to produce, and he used the example of Cenovus. So Christina Lake, maybe the cost of production is 30 bucks, or 18 bucks or something like that, even if it's only selling for $50 --

SUGGETT: Yeah, they're making some money.

PMB: -- you're making a really good return on that.

SUGGETT: Well those production numbers, though, he's talking about operating costs, I would presume is and so you can go on operating some of those projects without sinking too much sustaining capital, and actually they're starting to put a lot of capital into sustaining those projects,

but you've got to pay out that long lead on those billion-dollar plants that you've landed. And so that's where the ultimate economics allow you to keep a project going, but to make it economic the margins are fairly thin, and you've got to have big projects in order to do that.

PMB: And, of course, the example of Christina Lake was an interesting one. To get it started cost, what did you say, 40 or $50 million?

SUGGETT: No, that was the Senlac Project. We were over $100 million on the first phase of Christina Lake. Senlac was over $30 million.

PMB: Which was the one that Cenovus sold for double that money?

SUGGETT: That was Senlac.

PMB: Oh, that was Senlac. I beg your pardon.

SUGGETT: So they did Christina Lake, and it's not over, it's quite a bit over $100 million to do the first phase there.

PMB: Well I'm pretty well interviewed out. The last thought goes to you. Is there anything that we haven't talked about, but should have talked about, that you would like to put on the record?

SUGGETT: I've still been looking at this industry, saying that I think there's still a place for something that was what AOSTRA was, that helps fund pilot projects, and do that. The industry itself is starting to produce a lot of people that move around, and are helping the industry grow, but I think there's still a place for what there was. I don't know what the next technology is that AOSTRA is part of, but for the new technologies there's still something there.

PMB: Well, you probably recall that a year and a half ago, or whenever it was, when we had the last provincial election, the very first promise that Alison Redford made was an AOSTRA 2. And then, of course, the budgetary concerns came up, and it seems to be dead.

SUGGETT: So I haven't followed that close to know what the answer is on that, but I suspect that's the case.

I think it's timely you guys are tracking some of these folks now because I'm probably one of the youngest people you've talked to.

PMB: You are.

SUGGETT: Yeah, and that says something, right? When I'm over 50, and I'm the youngest guy that knows some of the history, and was --

PMB: And yet you've played a key role in some very important pioneering projects.

SUGGETT: Yeah, some luck, and a lot of hard work adds up, and at the end of the day that's where you are. But it's been a very exciting business. I guess the closing comment I would have is the regulators, the government, the companies, everyone needs to appreciate that the oil sands of Alberta, and the carbonates, all of that is going to make Canada the next Saudi Arabia, and it might take another 20, 30, 50 years to get there, but we're going to be an energy driver for the world, ultimately. Not that we aren't already pretty significant, but it's going to be even more so. Eventually they'll get through all of the shale oil back to this being a big, big, big deal.

PMB: And the issue there being that shale oil production is very prolific at first, but then it falls off very quickly.

SUGGETT: Well that's what we seem to be seeing is that there's a wave of getting this new technology that gets shale oil produced. I don't know how long that'll last, it may go a long time. Again, when all of that's done what's still going to be left is Canada and Venezuela's bitumen supplies are just so vast is incredible. The numbers that we quote in terms of volumes of oil that put us in what, third, fourth place, whatever we are in the world, are just little bits of what is actually out there. I think the big number is a couple of trillion barrels in the Alberta sands in carbonates, so it's very big.

PMB: Well thank you very, very much for time.

SUGGETT: Yeah.

PMB: It's been tremendous.

SUGGETT: Okay.

(End of Recording)

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