BRIAN A. ROTTENFUSSER

Date and place of birth (if available): Alix, Alberta

Date and place of interview: May 28, 2012 at the Geological Associates offices.

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: ROTTENFUSSER

PMB: I'm talking to Brian Rottenfuser who was a geologist, intimately involved with the Underground Test Facility. Today is the 28th of May, 2012 and we are at the Geological Associates office, close to downtown Calgary.

Would you mind giving me just a quick summary of your biography, of your life story?

ROTTENFUSSER: I was born in central Alberta, educated in a little town called Alix. Went to Red Deer College first year out of high school and then to the University of Calgary in education, of all things, because out where I grew up the only professionals we'd ever met were the teachers, doctors and nurses. I tried that and decided it wasn't a fit job for a civilized man and went back to school.

Along the way, I managed to take one geology course as an option and loved it. So when I went back, I went into geology. Because I had so many option courses already, I did my Geology degree in two years and did a master's program immediately following. And then went to work for... first of all, Gulf Oil for a couple of years and then moved up to the Alberta Geological Survey, which was the original founding department of what became the Alberta Research Council in Edmonton. And I spent 20 years there working in oil sands.

Eventually, I left there when the Klein Government was downsizing in the mid-90s and went consulting. Spent 16 very happy years working as a consultant, loved being a consultant. Didn't want to work for a big company downtown but I would happily do projects for them and deliver them and retired last year.

PMB: So you are now formally retired?

ROTTENFUSSER: I am.

PMB: Whatever that means.

ROTTENFUSSER: I've kept my certifications. I'm still a member of APPEGA and all of those things. Just in case something really fascinating comes along. But, at this point, I have no intention whatever of doing anything like that.

PMB: I have a story to tell you about Gulf and Alix. Gulf used to have a gas facility there and I used to work for Gulf, this was just after you'd left, I think. And I remember going to Alix, I was there on company business, and I drove into that town. And there was a sign just as you entered the Town of Alix that said, "Welcome to Alix. Water fluorinated by God."

ROTTENFUSSER: That's right.

PMB: Do you remember that?

ROTTENFUSSER: It's still there.

PMB: Is it still there?

ROTTENFUSSER: Or, it was a couple of years ago. It's still... they have naturally fluorinated water in that area. And the kids in that area grew up with good teeth.

PMB: Okay, there you go. Now your main involvement with the oil sands, as I recall, by the time you left Gulf which was seventy...

ROTTENFUSSER: '75.

PMB: ...'75, Gulf really wasn't involved much with heavy oil, was it? Or, oil sands?

ROTTENFUSSER: No. When I worked for Gulf, I did a variety of things. I was in the research group and worked quite a bit on the Mackenzie Delta. But, Gulf was a company that for probably ten or 15 years before had not hired. Or, they'd hired only a couple of people. Then, in about '73, they realized that they didn't have any young geologists so they started hiring, and I was one of the first. I actually joined them in '73 and didn't finish my masters until the next year. So I was working during the days at Gulf and at night up at the University getting the thesis done. And, after I'd been there several months they'd realized they'd hired several young, new geologists and maybe they should do some training. So they then put together a very informal training program. The carbonates guy, George Vexy, did a couple a days on carbonates. Modular Analog did a couple of days on clastics; the geophysics guys did something there. We all got a tour out to a drilling rig, that sort of thing. That was their training program. By a couple of years later, they'd formalized this

because they hired so many new people. But it was a new thing for them and somehow I got stuck in the research department. And after I'd been there a couple years, I'd figured out that was not going anywhere within the company. They'd hired lots of people. The other people were doing much more mainstream things. I was off in a research role; it was necessarily a good fit with me.

PMB: What kind of research?

ROTTENFUSSER: I was working on the clastics on the Mackenzie Delta.

PMB: Okay, so you were way up north.

ROTTENFUSSER: It was the time of the Parsons Lake gas discovery.

PMB: Right.

ROTTENFUSSER: I did some interesting work there and showed them why when they found a structurally low well, there was no porosity, but if they could find the high structural wells there was porosity. It's still listed as one of the big three gas finds up there.

PMB: So this was high up in the Mackenzie Delta and at that time there was a lot of excitement about bringing that gas down south, wasn't it?

ROTTENFUSSER: There was, but I figured out that I wasn't going to be a long-term employee with Gulf. And an opportunity came up with the Alberta Research Council in Edmonton. And I was still toying with the idea of doing a PhD at that time. So the opportunity came up, I actually... the research group was headed by Dr. Andy Bailey, very well-known person in the oil and gas industry in Calgary. And we got the morning of the parade off, plus another half day, sometime during the Stampede to go to the Stampede. I took the whole day off of the parade and I went up to Edmonton and had a job interview. When I later said, "I'm leaving. I'm going to Edmonton to work for the Alberta Research Council." One of the questions they asked was, "Well how did you manage to do a job interview?" And I said, "Do you remember that day for the Stampede Parade? I didn't see the parade, I was gone to Edmonton."

So, I went up to Edmonton. The Alberta Research Council at that time was right on the University campus, so it was short walk over to the geology department. Never did get around to doing the PhD. Got into playing racket ball and doing my research and raising a family and never did the PhD. But, had a lot of fun and then when they moved off to the south side of the city five years, I went with them.

PMB: In the Alberta Research Council, what were you doing then?

ROTTENFUSSER: My job, first of all, was Peace River Oil Sands. They were... by that time AOSTRA had been set up. And AOSTRA made the decision, that was the Alberta Oil Sands Technology and Research Authority and they had the funding. They'd made the decision that they

were going to hire engineers but for the geology they would go to the Alberta Research Council. So they had a deal with the Alberta Geological Survey Department of the Alberta Research Council to fund a certain number of geologists. So the geological survey was in hiring mode. So they hired me to do Peace River. Grant Mossop was doing Athabasca; he eventually became head of the Geological Survey and then came down here to head the ISPG in Calgary for a number of years.

PMB: ISPG, is the?

ROTTENFUSSER: The Institute of Sedimentary and Petroleum Geology.

PMB: At the University of Calgary?

ROTTENFUSSER: No, it's across from the University, but it is part of the Federal Geological Survey of Canada. Eventually, Grant was joined by Peter Flach. Daryl Wightman came in to do Cold Lake. Barb Tilley did Suffield. Sean O'Connell did some of the heavy oil deposits in east central Alberta. And John Kramers was the old timer in the group and he'd been there for a few years already. And he did the western part of Athabasca, what was called Wabiskaw at that time, it's later been rolled in and become part of the Athabasca deposit.

So, over a period of about five years all of these people were hired to do the different oil sands deposits. So we had a pretty good oil sands group. And then as there were pilots set up in each of these areas, that if AOSTRA was involved in those pilots, they would assign each of us to be their technical representative to those pilots. So when Shell was doing their Peace River Oil Sands Project, I would come to Calgary four times a year for the technical meetings. Likewise, if there was one that was in Cold Lake, then Daryl Wightman would come to Calgary, that sort of thing.

PMB: Now, I want to... the Shell...

ROTTENFUSSER: Let me tell you a quick story about going to my very first Peace River Oil Sand Technical Advisory Committee. It was here in Calgary, Shell of course ran... it was their big project. They had Shell US or Shell International, I don't remember, another branch of Shell involved. As I remember, it Mobil that was also involved and AOSTRA, those are the ones that I remember. A fellow chairing the meeting was Paul Kitzen and I've reminded Paul of this story after, some years after. But, first meeting was in February, it was colder than heck.

I flew down from Edmonton. And at that time, I had a big, bushy beard. I wore a sweater; a tie, but a sweater. Went into this large meeting, the technical representatives would sit around the table in the middle and then the people who... the company who worked on the project would sit around the outside. So there are probably 40 people in this room. And I look around. I'm the only guy in the room wearing a sweater. I'm the only guy in the room with a beard. At the start of each of these meetings, the chairman would go around and introduce the technical representatives in the center. And when he got to me, he said, "This is Brian Rottenfusser, he's going to be a technical representative for AOSTRA. Now, we don't really know why AOSTRA's appointing a geologist because this is an engineering problem. But you're very welcome anyway." At the coffee break time,

the reservoir modellers came up to me and almost embraced me. They were so happy to finally see a geologist on the project because they knew how difficult the reservoir was and how much problem they were having but they'd never been able to get a geologist there before.

PMB: Well, isn't that something, wow. But, that would also be Shell, wouldn't? You know, very technical. Well, no it should have...

ROTTENFUSSER: They regarded... Peace River Oil Sands is a... all my work there was in feet. It was about 90 feet thick and within those 90 feet there would be five to eight little shale beds about this thick. That was it. They regarded it as a thick, uniform sandbox. What do you need a geologist for? Except that the reservoir engineers knew that, when they steamed it, it wasn't behaving as a uniform sandbox.

PMB: Well, was it because of the shale bars?

ROTTENFUSSER: Some of it was that, some it was because they hadn't picked up that right at the bottom things changed. They had cored some of those but the logs didn't necessarily catch the very bottom of the hole. And some of their injection was in this piece at the bottom where the logs didn't catch it. Fortunately, I managed to track down, stored away in a warehouse here in Calgary, they had core. Sometimes, only three or four metres of core and we were able to show that the sand size was totally different at the bottom. And the communication of the steam through this was affected. And then you had an interface between the sand and the much coarser... this really fine sand at the bottom and coarser sand above, that the steam didn't necessarily travel where they though it was going to. Sometimes it went to the side instead of up. There were complications there that hadn't been picked up because if you just looked at the logs, it was big, blocky type sand; interesting things.

PMB: Well, it interests me very much and one of the reasons... I've had a hell of a time getting information about Shell's Peace River experience. I know that they were drilling there, that they first found the reservoir in the 1940s and I know that they experimented with it over the years. And, actually, we're going to be interviewing Keith Firmin, whom you probably know, next week. But, any information that you can tell me about the early history of Shell's involvement in Peace River, we'd be really grateful.

ROTTENFUSSER: I'll have to go search my memory banks for that one and dig... I would have to go dig through some of my files. I haven't worked on Peace River, really, since 1985. So, it has been quite a while. I do have some my older parts, but what I've told you are the things that come to mind. I just don't remember.

PMB: How many years were you involved with that project?

ROTTENFUSSER: I was involved with Peace River for ten years. How many years I was on that technical advisory committee, I can't tell you. I don't remember that.

PMB: Please tell me whatever you can about the development during that period. So this would've been '77 or something to '85 or?

ROTTENFUSSER: In '85, Shell was going to go to their Peace River Expansion Project which was, I think, 140 wells, something like that. Of which, they were coring all of about nine or 12. I don't think they even ran logs on some of them. This is how much they thought it was a sandbox. But, because they were going to that and it was supposed to be a commercial development they were buying out their partners. So they bought out Mobil's share and they bought out AOSTRA's share. And the last thing that they did was to... they flew all of us up. Most of us had never visited the project. But in February of '86 they flew us all up to Peace River for a couple of days of wrapping up the research project, which was the PRISP, Peace River In-Situ Project.

Wrapping up the research phase of that: banquets, tour the facilities and this sort of thing. And then we were finished. But they had seconded me to... one of the deals that AOSTRA had made was that before they could be passed over their involvement there had to be certain technical requirements met and there were certain reports needed. And they wanted a detailed geology report on PRISP and Shell did not have that. The only geologist they had was Don Day, who did other things as well as oil sands and he had done regional geology. So, Shell asked the Geological Survey if they could borrow me.

So, I was seconded to Shell for the summer of '85 to write the geology report on PRISP and to fulfill its requirement for AOSTRA. Which was great, I'd been at the Geological Survey for ten years, was starting to wonder, could I make in industry. And the last day I was at Shell, the project manager at that time was a fellow named John Flynn, called me in and said, "Brian, we don't have any budget but we've watching you while you've been here. We'd be interested in bringing you into Shell. We're wondering if you'd be interested in that at some time in the future but we won't have any possibility until the new budget year, which is going to be into '86." And I said, "Yes, I've enjoyed it here. I'd be very interested in that."

So when they did that final wrap-up tour, took us up in February '86 to Peace River, I cornered John and said, "You mentioned this to me last fall, what's the possibilities?" And he said, "Well, have you looked at the price of oil." And, of course, in February of '86 the price of oil had just dropped through the floor. There was no possibility at all, so I spent another ten years with the Alberta Geological Survey.

PMB: I wonder whether you're off by a year there. I think it was in May of '85 that it tanked.

ROTTENFUSSER: Was it May of '85?

PMB: It was May of '85. I remember that very well, yeah.

ROTTENFUSSER: I could be off by a year.

PMB: I think you're off by a year. At the beginning of this discussion, I thought I heard you say that you went up to Edmonton to be interviewed by the Alberta Research Council.

ROTTENFUSSER: And the Alberta Geological Survey is a department of it, or was a department of the Alberta Research Council.

PMB: Okay, I understand that now.

ROTTENFUSSER: They were the original department that the Research Council was built around. And then fast-forward to the early 90s as the Research Council was re-orienting itself and budgets were being cuts and they were consolidating departments and laying people off. They made the decision that they were not going to do anymore resource based research and the geological survey was old hat and they didn't need geology anymore. And there were great negotiations going on as to whether they were going to continue, whether the geological survey was going to carry on or not. Now, by that time, Alberta Energy was providing some of the funding for the Alberta Geological Survey. So, they stepped in and the Alberta Geological Survey, at the end of March in '95, moved over to Alberta Energy for one year and then the next year, moved to the Energy Resources Conservation Board. But when that move came at the end of March in '95 I didn't follow them. That was when I took my leave. They had offered a voluntary severance package and I think there were seven of us that took it.

PMB: Now this takes us just about up to the time of the Underground Test Facility. I think that was being constructed around '85, wasn't it?

ROTTENFUSSER: It was. I cannot take any credit for the location of the Underground Test Facility. When I'd mentioned the people working the different projects or different areas, Peter Flach had come to join Grant Mossop working Athabasca. And Grant moved on and became department head from, as I remember, about '81 to '84 something like that. For about four years. And Peter had become the main project geologist on Athabasca. Well, that was the period that AOSTRA was searching for a location for the Underground Test Facility. They first drilled an area, it's actually near the road out to the Underground Test Facility and I believe that it's partly now covered by Syncrude's big waste tailings pile, down to the southwest of their mine. It was an area that proved not to be very much oil sands. So they went looking for another area and found the Underground Test Facility site.

So they had, by the time I became involved, they had already selected the site, had drilled the shaft and put in the tunnels and the plans for where Phase A was going to be, the Phase A pilot was going to be, were already in place. I don't think I was involved in citing the pilot. But that was about the stage where I came in. I may have had some input in just where we were positioning things. But, certainly as we started to drill Phase A, I was right there in the thick of things.

PMB: And so Peter Flach was the Chief Geologist on that first then?

ROTTENFUSSER: He was the regional geologist doing Athabasca. He helped AOSTRA pick the site for it. And around that time, Peter left the Geological Survey and moved to Calgary to join, I think it was Esso. And there was a need for a geologist on the Underground Test Facility. Peter had put together a number of reports on the Regional Geology there and there were other people filling in some of the more southern parts of Athabasca. But, UTF was kind of a gap. I basically wrapped up Peace River and they were looking around for what was I to do and there... I had a few small projects there and they said, "Here, you've finished with Peace River, PRISP, why don't you take on UTF."

So I moved over to take on UTF which was not, in the early thinking, going to be a huge project. It was interesting, it was different. These were the original Phase A pilots, the well completions. There would be three pairs of wells, the completions were only 15 metres long and there were going to be three observation wells. Well, about that time, industry started to get interested in this and started to buy in and I think Esso was the first. And more money became available. So, there were various delays as we got things going and more industry got involved and more money became available. And, what had started out on the Phase A pilot to be a three well observation, or three observation wells, turned into 26 observations wells.

So it was just at that stage that interest took off, more money became available, and more companies got involved. Chevron said, "Hey, we've been looking for a place to try our HAS Drive project, could we do it up there?" Okay, yeah, we can do that over here. HAS Drive: for Heated Annulus Steam Drive. Now, can't tell you very much about that one because it was all hush-hush and secret. But I could go out and stand in the middle of it and say this is where they did it.

PMB: Now, we had a really interesting interview on that [??] with Gerry Stephenson, some months ago. He, of course, was the mining engineer...

ROTTENFUSSER: Right.

PMB: ...who originally came up with the idea and he designed the mines, the shafts and tunnels and that sort of thing. Now, as I recall from that interview, the official opening was in '87. Actually, the date of the official opening is that article that I sent you.

ROTTENFUSSER: I've forgotten it.

PMB: And I thought it was a couple of years later that the 16 oil companies actually became interested in it?

ROTTENFUSSER: It took a while before they got involved. I can't... I brought along the original report that I did, Preliminary Report on UTF, Phase A, Geology which was dated '88, January '88. And we started drilling the horizontal wells from the tunnel commenced in October of '86 and was completed in September of '87 and 26 vertical wells were drilled between August and October of 1987 for the placement of instrumentation. And, my memory on it says that the reason we were able

to expand and put in 26 wells is because we had then gotten some industry involvement to make some more funding available.

PMB: That would make sense because what Gerry said is that, at the official opening which was around September '87, a whole bunch of people from the industry showed up. And they looked at this thing and they were a little bit astonished. And he told me that the then president of Shell, I wonder whether that was Stoneman, I think Stoneman was the president of Shell at that time. And he said to Gerry, "This is like a subway to the well-head." It was a great expression.

ROTTENFUSSER: It was.

PMB: What was (Doug) Stoneman's first name? But, in any case, and so maybe because of that official opening which was around September '87, I believe. Maybe that's when the companies began to actually commit funds for that.

ROTTENFUSSER: It was an impressive looking place. My first visit up there, I went into my slides and the earliest slides I can find are stamped March of '87. So I got involved in '86, at some point in '86 I don't remember when. My first visit to site was in early '87 and then I was up there quite a few times because I was very involved with the drilling and a number of other things there. I know that the first time I went up there and it was the first visit for several of us. But in particular, I remember Jack Suggett, who was a junior engineer. And he went on to...I've lost track of him, but Cenovus, I believe. But we were so excited, running around this place and looking it over. Because it was so new and unique and the mineshaft was there, the tunnels were there.

The drilling rig at that time was already operating because they started drilling in October of '86. So they were already drilling horizontal wells. We actually climbed up on top of one of the oil storage tanks, probably not the safest thing to have done. But stood on top of this to take photographs of around the site and it was a great project. What I remember about it was that there was a sense of excitement, there was a sense of things happening. We were trying new and different things.

PMB: Okay, I'm going to ask you about that but before I forget, Doug Stoneman.

ROTTENFUSSER: Doug Stoneman.

PMB: Doug Stoneman was the CEO of Shell. He's the one who made that great statement about the subway to the well-head.

ROTTENFUSSER: And one of the people that you should interview, if you haven't, is Jack Haston. He was actually the project manager at that time and for the first two or three years that we were operating. And then he retired and Cam O'Rourke took over. And Jack, they're both engineers, Jack was an innovative, brilliant engineer with a great perception of science and the whole idea of being able to develop and prove something. By the time he turned it over to Cam O'Rourke, Cam was an administrator.

PMB: Okay, now can you tell us what the major achievements were for the UTF? And of course, the most famous is that it proved SAGD.

ROTTENFUSSER: It proved SAGD, Steam Assisted Gravity Drainage. But let me back up and tell you one of the problems we had because it then illustrates what an achievement it was. When we drilled the observation wells, these ones were 26 wells drilled between August and October of '87. The very first well we drilled was AT-1, right in the centre of the pilot. And, for future historians if you go to try and trace these, these wells were all on... all of the work there was done off a mine grid which was extrapolated from the Syncrude Mine Grid. And I know that when AOSTRA, or when UTF was used for illustrative purposes in the gas bitumen hearings in the late 1990s, the fact that these wells did not have formal ERCB well designations was a source of great frustration and they had a lot of problems there, but we working off mine grid.

Anyway, AT-1 was the very first well drilled right in the centre of what was to be the pilot. Three horizontal well pairs, 50 metres long, right in the middle. We drilled the well and I brought along a cross-section to show you that we encountered a problem. And we cored the entire well; we slabbed the core near the bottom. On this cross-section you can see here is where the producing well is, here is where the injector well is and right in between them, essentially, is this shale. Above it a very nice uniform body of oil sands. But right between the two, is about, as I remember 1.3 metres of ugly shale. Now, I have photographs of it with me.

PMB: So there was no way that the steam could get through that?

ROTTENFUSSER: Well, we slabbed this well. I don't remember the details...we must've frozen it overnight.

PMB: And here you drilled it right into the shale.

ROTTENFUSSER: Well, in the next well over. But we had actually... one of my technologists from the Alberta Geological Survey, Campbell Kidston, had come up with me. We had gotten a masonry saw and I have photographs of being set up in the workshop at UTF slabbing this core. Because, this was so important, we weren't going to ship it to Edmonton and have core labs take several days, or have trucking time. We were freezing it as fast as we could and we were cutting it to see what we had for the reservoir. And we discovered this shale in the core, we ran he logs, we looked at it and we actually had a meeting in the warehouse of all of the relevant people.

Jack Haston was there, the drillers were there, the reservoir engineers were there. We were all gathered around this core that was lying on the floor and we had a serious debate about, were we going to move the pilot. And remember, they had been drilling horizontal wells since October of the year before. So they already had two or three of these horizontal wells in. And here we were standing there debating were we going to move the pilot. We decided that we'd better drill another well or two and see what happened. Fortunately, this was not a solid block of shale, it was kind of pieces. And one of Murphy's Laws, it was the worst well out of the 26 wells we drilled. So, we drilled the others and it wasn't as bad so we kept on going. We started eventually to steam and said, "Well,

we're going to find out how robust this process is." And I believe it took six months to get our connection between the injectors and the producers.

PMB: So you had drilled 26 wells?

ROTTENFUSSER: 26 observation wells.

PMB: Oh, observation wells.

ROTTENFUSSER: They were clustered. By the end of it, we had observation wells so close together that the iron in the hole of this well was starting to affect the logs in the hole of this well. This is all, 26 wells in an area probably roughly the size of a football field.

PMB: How many well pairs did you have?

ROTTENFUSSER: We had three wells pairs and with 50 metre completions and the upper well is... in SAGD, the upper well is the injector well and the bottom well is the producer. But you have to establish communication between them. And then you put in your steam in the upper one, heat rises, the bitumen becomes soft and flows down to the producer, you pump it out.

PMB: What was your experience as this thing steamed up and you began to see a little flow?

ROTTENFUSSER: We were in communication all the time and this was so exciting to see this and to see that something was going to happen. And, of course, by this time we had looked at this shale minutely. But, because there were breaks in it, it wasn't just a solid block of shale. It turns out that it was probably a rubble zone, shales that were discontinuous. I know that over about 150 metres there were two wells that were drilled for whatever reason. I wasn't involved there at the time. But two wells that were 12 or 15 metres apart, quite close together. One had about a four-metre shale in it, the other had none. So we had a zone in there that, for whatever reason, had discontinuous shale in it. We just happened to hit an ugly one in that first drilling.

PMB: Isn't that something. Did you get to know Dr. Roger Butler at all?

ROTTENFUSSER: I certainly met him several times.

PMB: Do you have any impressions of him that you'd like to share?

ROTTENFUSSER: I didn't know him that well. I did... he later, and this is well away from UTF, in his later years had a company named Grav Drain, his own company, with a fellow named Chi-Tak Yee.

PMB: We actually interviewed Chi-Tak for this project.

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ROTTENFUSSER: That's terrific. He's over at MEG Energy, he's the vice-president now and I was the one who recommended him to MEG Energy.

PMB: Oh, isn't that interesting.

ROTTENFUSSER: But, Chi-Tak was one of the reservoir engineers who got involved with UTF in its later times, into the, I would say the early 90s, mid-90s perhaps. And I actually reported to him in some of my later work that I did with UTF. After I was no longer involved with the UTF but when consulting and he was no longer with UTF but he was working on various things, but working with Roger Butler and Grav Drain. A project came along that he got... well he and I worked together on a couple of land evaluations. And then a couple of fellows out of Ormat Process Technologies in California and their parent companies in Israel came to town looking at oil sands. And Chi-Tak and I did a bit of work with them. They were basically turned away, there wasn't anything happening. That was in about '97. These fellows from Ormat came to town in about '97, knocked on some doors looking to get involved in the oil sands. Chi-Tak and I did evaluate... did a little bit of work with them at that time and basically they were sent away.

A couple of years later, in '99, when the price of oil was again quite low they came back. They had gone off, they had done some studying, they had taken Roger Butler's course, they came back in when the price of oil was way down and as they said, "Look at the industry counter-cyclical and see if there were opportunities." And, at that time, Chi-Tak called me up and said, "Brian, these guys from Ormat are back in town, I'm not interested in working with them but go ahead if you'd like." He said, "I've told them to call you." I ended up doing some work with them helping them evaluate various pieces of land. They eventually bought into what was called the "Cheecham Lease" just southeast of Fort McMurray. They changed the name of it to Long Lake. We managed their drilling program for the first couple of years. Then Nexen bought in and it's become the Long Lake Project, which has become quite well known in the industry.

PMB: And it hasn't been a happy experience for people, has it?

ROTTENFUSSER: It has not been.

PMB: I want you to focus on this because the Long Lake Project has been basically a catastrophe, essentially for the partners in it. Or, am I misreading it?

ROTTENFUSSER: Even when Ormat was looking at it before they created OPTI Canada which became the Canadian subsidiary, we knew that there were lean oil sands zones within that reservoir. But it did have up to 50 metres of oil sands, sometimes with some lean zones in it. It was something that Suncor, who owned the entire lease, had identified. It was a reason that they were willing to give it up and they had other priorities and Ormat, or OPTI is what it became, were able to buy in or to farm in. And the deal was that they had to drill 60 wells, there were as I remember 22 sections of land which had no well on them whatsoever.

So they had to drill a well on each of those and then the other wells, they said, "Cluster together and find us a pilot." And, I positioned, I was the one who selected those first 60 well sites. And I said to them, "I've got to put 22. I know which sections they've got to go in. That leaves me 38 wells. Can I split them? You want to define a pilot area, can I sort of cover two areas just to increase the odds?" They said, "No. You drill one area." I said, "What if we don't hit the right area?" They said, "There won't be a second drilling program." That was it, you get one chance. So, fortunately, drilled up an area that was pretty good, became the pilot area and we managed the drilling programs for them for the next couple of years until Nexen got involved.

PMB: But it has been, as I recall, OPTI... the shares tanked and...

ROTTENFUSSER: Oh and I lost money on those.

PMB: And, okay.

ROTTENFUSSER: When things went downhill here in 2008 they didn't have the financial backing to carry on through. The problem is because there are thief zones; there are low saturation zones in that reservoir. They lose a lot of steam.

PMB: What was the term you used?

ROTTENFUSSER: Thief zones.

PMB: T-H...

ROTTENFUSSER: T-H-I-E-F.

PMB: ...I-E-F, okay. They steal, they steal...

ROTTENFUSSER: That's where the steam can just go off anywhere.

PMB: Into water or something like that.

ROTTENFUSSER: And until you've got a big enough area of steam to build up the pressure to control that, it's an issue. Or, develop some other technologies that will work their way through. So Nexen has been working away at that. But, because production wasn't able to ramp up as fast as expected, OPTI didn't have the financial wherewithal to carry themselves through the financial downturn in 2008 and their stock took an awful beating.

PMB: And what eventually happened to their share of the asset? They were bought out, weren't they?

ROTTENFUSSER: Nexen bought out another 30%, I think it was 30%. Anyway, Nexen bought out a greater portion and then the Chinese came in and bought out the remnant of OPTI.

PMB: That's right.

ROTTENFUSSER: But, it's just another of the projects I was involved in. I moved around, I got to be involved in several different projects as we went along.

PMB: Now, one of the things that I would be quite interested in was I noticed that you were involved geologically with the Surmount Project, well it was originally when I was at Gulf, it was the Gulf Surmount Project. The JACOS, that's the Japan...

ROTTENFUSSER: Japan Canada Oil Sands Company.

PMB: ...Canada Oil Sands Company, their Hangingstone Project and MEG's North Christina Lake Project. I think I have a lot on Christina Lake which we got from Chi-Tak but I wonder whether you can tell us about the Surmount and the Hangingstone?

ROTTENFUSSER: My involvement with Surmount was a relatively short period of time. But, I worked at Gulf full-time for a year. As they were getting that pilot up and running they had...

PMB: Now, that was in the... we're talking about going back to the 70s, is that correct?

ROTTENFUSSER: No, no. This is '97-'98.

PMB: Oh, okay.

ROTTENFUSSER: So, I was up there, I visited it but they'd already gotten the pilot built. I was involved in the evaluation of some of the data from it but I also looked at that project because it was early enough on, that everybody was looking it. I evaluate that project for three or four other companies since they were looking at the public data. But my involvement with Gulf was really, I had a couple of stages there, but one of them was with the gas bitumen hearings. And, my involvement with the pilot and the drilling of a bunch of exploration wells around it. I had a much more general involvement in that particular project.

PMB: The gas bitumen hearings were about the technical viability of producing gas that's sitting over a bitumen reservoir, is that correct?

ROTTENFUSSER: The gas producers knew how to produce the gas that was no problem. At issue was the technical viability of being able to produce the bitumen after the gas had been produced, and the pressure in the reservoir had been depleted. Because, when you put in a SAGD project and you're putting that steam into the upper well, as it rises eventually you melt out the bitumen which flows down to the producer well. Eventually, you get to the top of the reservoir. And if you're putting that steam then, under pressure and if you've depleted the pressure off the gas at the top then you've now got a pressure differential. And any avenue that the pressure can find or the steam can find, to move from the high pressure to the low pressure, away it'll go. And once you've done that, you've lost your ability to produce the SAGD. That was the gist of what was being argued. And

eventually, the board saw fit to shut-in the gas wells over certain areas. And the first one of those was the Surmount area. So this is where I spent a lot of time understanding Surmount and understanding the process there, moved on to other processes.

PMB: Now, I'm a little confused and maybe you can clarify this. I remember when I was at Gulf in 1980 or thereabouts, '81. I thought they already had some sort of AOSTRA pilot project at Surmount. Do you have any recollection of that? I know that you'd gone, left the company by then.

ROTTENFUSSER: I do know that when we were looking at Surmount, just to the northeast a little ways from the original pilot was there was a cluster of wells and they did not have the Gulf name on them. They had a different name which escapes my memory now. And when I asked, I was told that was an early pilot. But it was not a listed... like I said, those wells did not have Gulf's name on them, they had a different name.

PMB: So there were other pilots in there.

ROTTENFUSSER: There were many, many pilots in Athabasca, Cold Lake. I did a project for AOSTRA in about 1983 where I went through all of the pilots that I could find, and I don't remember if they were restricted to Athabasca but it being the biggest deposit that's where probably most of them were. Where I had created some kind of data sheet and was simply putting together a report on the different pilots on location, depth, thickness of the reservoir, whether there was water, whether there was gas, what type of process had been tried, what dates it had run. That sort of thing and I created data sheets for all of these different projects. And there were many, many projects that had been tried in Athabasca.

PMB: Let's go back a little bit to the AOSTRA period which is kind of at the first AOSTRA period which is pretty much when your career began. I think it was '72, no '73 or '74 that AOSTRA was first announced and began to fund projects. Based on your experience at that time and your involvement with the geological survey, what kind of impact did that have on the oil sands business?

ROTTENFUSSER: It had an outstanding...

PMB: Well, on the petroleum industry, I think would be the better question.

ROTTENFUSSER: Looking at it from now, 30 years on, huge impact on the petroleum industry overall. But at that time, as I just said, there had been a number of small pilots run by different companies in different places. And the information from those was closely guarded secrets. AOSTRA was the first, I won't say the information was public that they did because if there was confidential processes being developed those were kept confidential. But they encouraged dissemination of knowledge. So as I mentioned, one of the things they did is they enabled the Alberta Research Council through the Alberta Geological Survey Department to hire a number of oil sands geologists. Part of our mandate was to map the different deposits and give talks on whatever aspects of the oil sands. And it didn't have to be just the stratigraphy and thickness of the

bitumen and so on. I think the first talk I gave was on a mineral that I found in the Peace River Oil Sands named dawsonite, which is...

PMB: As in Dawson, George Dawson?

ROTTENFUSSER: Named after the... George Dawson. It's an odd... it's a sodium aluminum carbonate. It's almost identical in chemical composition. I've forgotten now to whether it's Rolaids or Tums. But it's kind of a long needle shaped mineral which I found when I was looking at samples of the oil sands in thin section. Or, if I took the oil out of them in a hand specimen you could see this. And we eventually concentrated enough of it to get chemical analysis and so on. And I gave a paper on that, it...

PMB: So there's a business opportunity here to develop a Tums mine? Is that what you're saying?

ROTTENFUSSER: I don't think so, but.

PMB: Oh, okay, just checking.

ROTTENFUSSER: But it was one of the things that the people at Shell had wondered about is why when they produced the oil sands, did they get so much carbon dioxide off. Eventually, they decided that probably what was happening, this dawsonite was occurring in the richest oil sands. So probably it was decomposing and that was probably one of the sources of the carbon dioxide. So any aspect of oil sands, any geological aspect was our mandate to publish on that. And if you look into the literature, the engineers who were working directly for AOSTRA were also publishing all kinds of papers. And occasionally, we even communicated in joint ones. It led to this bunch of knowledge, a bunch of information coming out on oil sands. They held conferences for the purposes of trying to encourage more interest in the oil sands. So it moved ahead on many fronts but it led to kind of a ground swell of enthusiasm and knowledge in the oil sands. So AOSTRA had a huge impact.

PMB: I think another feature was part of the deal was that if AOSTRA funded your project, AOSTRA owned the patents. And of course, Eddy Isaacs told me in an interview once is that the... they never really did figure out how to use the patents or to make money on them. So in effect, those patents ended up in a black hole. So the outcome being that this just really became common knowledge.

ROTTENFUSSER: Well, the information on UTF even companies that were not involved could buy that information. For some reason, I've got a million dollars stuck in my mind whether that was the right number or not for a company to buy in and access that information, I don't know. But, somebody like OPTI when they got involved could go and buy... get access to the UTF information.

PMB: I'm thinking for example, of a Surmount test facility around 1980. If they came up with something that really worked, the patent... if AOSTRA paid for it, AOSTRA owned whatever patent they might've developed.

ROTTENFUSSER: Right.

PMB: Now, I think we've covered most of the important things. You were involved with the UTF for how many years?

ROTTENFUSSER: About 11 years. I...

PMB: 11 years. I know quite a bit about it in the early years, could you talk about the later experiments?

ROTTENFUSSER: Let me tell you one story, which I thought of and it would be interesting to relate. And this goes back to fairly early on and it may have been when I was headed... I was headed up to the UTF and there were some issues as they were first drilling the horizontal wells. Remember the drilling rig which they built from a mining drilling unit was designed for underground but they had to modify it and put on equipment so that they could have a flow of drilling mud. This drill rig was placed in the tunnel and because the oil sands were from, the top of the tunnel to the bottom of the oil was about 15 metres, the drilling rig was aimed up and I have photos of that.

When they drilled the first horizontal wells, as they went through from the limestone into the sand above there was a huge change in pressure and I can't... I've been racking my brain and I can't remember whether it was a spike up in pressure or a drop in pressure. But, I'm thinking it was a spike up, but I'm not totally sure on that. And there was some question of what there was at that interface, whether there was a cemented zone or why we had this pressure problem. So one of the things I did is the first well had problems and they noticed this pressure problem. The second well they monitored it carefully and still had some problems. So for the third well, Jack Haston, who is the project manager called me up and said, "Brian, I want you up here we need to go through." So I sat on the mud tanks, catching samples and monitoring. And the mud tanks were up on the surface, so they ran the mud up the shaft and into the tanks on surface.

This was in the mid-summer sometime, because I remember it only got sort of dark, it never got totally dark, it got sort of dark for about three hours. And there were Swallows nesting in the buildings and they had a semi-trailer there with the doors open and these Swallows had built their nests up in there. And it got dark enough they quit flying for about three hours, in the middle of the night and the mosquitos came out and just about ate me. But, I'm up there monitoring the cuttings coming out. Jack Haston, the project manager, is sitting beside the driller down below and we've got a telephone link back and forth as we're keeping an eye on anything we can find to explain what's happening as we got through that interface.

And basically, it got down to, if they were carful enough going through it wasn't a problem, they had just not watched their pressures carefully enough. But I remember specifically sitting out there and doing that. But, at that time Clem Bowman was chairman of AOSTRA and I remember running into Clem in the washroom of the airport. And this is probably out the old municipal airport in Edmonton. And chatting with him and telling him... I was headed up to the UTF and it may have been for this incident when I was going up to monitor the drilling. And I remember Clem reminded

me of this some years later because he said, he goes, "Totally envious, I was going off to do some science and he was headed for another meeting."

PMB: You could've swamped places or something.

ROTTENFUSSER: He would've been happy to swap.

PMB: We have interviewed Clem, by the way, for this project.

ROTTENFUSSER: I know he remembered that for some years. Anyway, from the original Phase A, after a couple of years and being able to get steam around this shale in the bottom that was a concern. They then drilled, and I think the drilling was done in about '89, the Phase B Project which was to the north and east of Phase A. And those were 500 metre long completions. And I brought a cross-section of that along, not particularly to show you the geology of it, but to show you that the thermal couples are on one metre spacing through the reservoir. There has never been another project anywhere with so much instrumentation and there will never be another with that level of instrumentation. As the steam rose through the reservoir, we knew metre by metre where that steam was.

PMB: So that really gave you the science of how that system worked.

ROTTENFUSSER: And because these were 500 metre long wells, this was closer... At that time, they thought of 500 metre ones as commercial length. Now, of course, I think some of them get up to 800, maybe even 1,000 metres. But 500 was considered to be a commercial length. So the results from Phase B gave the scale up factor to let other companies then understand how the steam worked within the reservoir. And it was really from Phase B data that they have gone and done... each company does their own slight variations on SAGD but that's...

PMB: Phase B ended when?

ROTTENFUSSER: Not that long ago. It was still producing just a couple of barrels of bitumen a day and I believe it was in the period when Devon... remember UTF eventually was sold to Gibson, I'm not sure if I got these right. But, I think it went to Gibson, then to Devon Energy, then to...

PMB: Petro-Canada.

ROTTENFUSSER: ...Petro-Canada which became Suncor. Somewhere in there, and I'm thinking it was with Devon because it was John Pierce (Pearce) who was in charge of their oil sands and I think he was with Devon, told me that his instructions were to get as much production as he could out of the oil sands. And they had other things going, but and he said, "They haven't told me to shut down UTF and it's still producing bitumen so I'm going to keep it going." So he was trying to get the last...

PMB: I tried to get some information from Suncor about it six months or a year ago. They don't even know that they own the property.

ROTTENFUSSER: The geologist does, I talked to him...

PMB: Yeah, well I spent ages... because they were... it's really funny but they didn't know what I was talking about. I was talking to the PR guys because I was writing an article about Rick George, because we interviewed Rick for this project.

ROTTENFUSSER: Right.

PMB: I wanted to ask you, I think we're pretty much done. I'd like you tell me anything you can about JACOS, which is the Japan Canada Oil Sands Company. It was the first farm company to become active in the oil sands.

ROTTENFUSSER: They bought in, oh way back when. And they had...

PMB: I keep thinking it is '79 or something?

ROTTENFUSSER: That could well be. They became part of a group called the PCEJ Group, Petro-Canada, Can-Oxy, Exxon and JACOS. And they had, if you could find a land map from 20 years ago, had huge land holdings around the oil sands. They eventually broke that up and I can remember, this was in '99 that I was working with Petro-Canada on the gas bitumen hearings. And Derek Lee was their oil sands geologist, it was the fellow I was working for and there were PCEJ meetings. And each of those four partners had a different mandate. And Petro-Canada by that time was gung-ho developing oil sands. Can-Oxy would sit on the fence and go with the flow. Exxon would always have to go to senior... fly it through Exxon, you know the big corporate headquarters and could never get the funding. And JACOS just never had any money.

And I can remember Derek coming back just fuming from these meetings, because each agenda was different and they could never make agreement. So after that through, I would say '99 to 2004 probably, they negotiated and eventually broke up the PCEJ Group and the different companies got different pieces of it, each had their preferred piece of land. Can-Oxy which became Nexen again, couldn't make up their mind. So what they did is they kept 25% of everything. So they are now 25% in several different projects. But JACOS out of that got what is the Hangingstone. And they had somehow gotten about a three and a half square mile area to be 100% their own that they could do their experiments on and that had originally been a Petro-Canada pilot there and then they bought it, modified it and then eventually built their own.

But through the break-up PCEJ they then got the rest of that lease which is what they're now... I believe their application is before the board now, to go for a commercial area there, or a commercial project there. They've experimented and experimented. They must've been involved with UTF because they had access to the UTF technology. They've done...

PMB: They were involved with the UTF.

ROTTENFUSSER: Okay. They've done well pairs up to about... they do them by letters and I went up there and sat some of those wells they were drilling, I was involved in their drilling programs. But they're up to somewhere around P, Q, R... somewhere in the alphabet in terms of well pairs. They have been consistently, for several years now, running at about between 9,000 and 10,000 barrels a day. They still truck their production. They've looked at the economics many times. But, until they get bigger than that trucking is still the most economical way to go.

And I know Mr. Matsumoto, who was the president until about four or five years ago, I can remember him telling me, "Brian..." he said... at one time JACOS was, they were maybe third in all the oil sands in terms of getting a project, getting it going and proving that they could do a significant level of production. And then, because they couldn't get all the senior management. Their ownership structure was very complex and it took them several years to get that sorted out. And they just couldn't get it all organized to go to the commercial operation. Now, they have got that sorted out, they've drilled up a commercial area and their application is in, so.

PMB: Good.

ROTTENFUSSER: I wish them well. They've been a great company. I've done work for them for probably 15 years and it's off and on and it's been a great time.

PMB: I tried to reach Mr. Matsumoto for this project and nobody at JACOS would even reply to my emails....

ROTTENFUSSER: He transferred back to Japan.

PMB: He's a big player in JAPEX. Now, he's quite close to the top of the ladder there. I think that's Japan Exploration Company or something, it's international.

ROTTENFUSSER: Right.

PMB: They didn't respond to my inquiries and I was hoping I could interview him when he back in Calgary. One last question, this has been a very long but a very interesting interview. I think your comments will be particularly interesting because of your involvement with government agencies. What do you think about the role of government in oil sands development? Has it been supportive? Has regulation been effective or should it be more stringent?

ROTTENFUSSER: I'm not sure I can comment. I know there was a lot of fuss a couple of years on the price structures as the Stelmach government tried to change the royalty structures. And I'm really not qualified to comment on that. I can certainly comment on AOSTRA and the impact they had and it was the key that opened the door. It was a very far-sighted thing to set up an agency with the mandate of developing the technology. Because, people knew the oil sands were there. Peter Pond saw the oil sands when he came through, when in the 1700s, 1790 or something?

PMB: 1785, I think.

ROTTENFUSSER: 1785, I was close. There have been various things tried for years and years. But until there was the government push, the government funding to do research. And they certainly went down many hallways that ended. They tried a lot of different things. But they also did some things that worked. And it was that putting together a bunch of smart people to try different things and then being able to get some industry involvement, which led to more funding both from industry and from government, and then getting that technology out there - huge, huge impact. I saw in one of the journals that I get, the production from SAGD is not quite but almost overtaking the production, I think next year it should overtake the production from the mines, something like that. It's that close.

PMB: That's amazing. I'm sure you aware that there will be an AOSTRA II announced very soon.

ROTTENFUSSER: I actually hadn't heard that.

PMB: Yeah. Well... it's funny I wrote an article that was suggesting that a few months ago and just before the election. And one of the first things that Allison Redford suggested at the beginning of their campaign, it was that there should be an AOSTRA II. And I was a meeting about a week ago, a heavy oil meeting, in which several people... in fact, I think it was Clem Bowman actually, who might've said at that meeting that there would be an AOSTRA... that there AOSTRA II meetings going on right now.

ROTTENFUSSER: Interesting.

PMB: That is going to happen within the next couple of months.

ROTTENFUSSER: That'd be very interesting.

PMB: Isn't that exciting.

ROTTENFUSSER: That time of development, and I've been involved in so many different projects I know this that if a project is doing well and looking good and looking promising there is a sense of excitement and enthusiasm and people put in long hours and everything rolls. And if it's not doing well and not looking good, the emotions go downhill. And UTF was a time that, there was a lot of excitement and a lot of interest. And trying different things and moving ahead with it. Even though on... and some of it was pretty basic. The technical advisory meetings, one of the first items every time would the facilities, the administrative stuff. And the discussion on the road in there, because they had their own road in and took... it was a horrible road. But they had to have it in order to truck the production out.

And John Greenwell would talk about the condition of the road at every meeting. But even with that, there was still... we should try this, we should try that and we can increase production this way. And some of the things they developed have not been used or not proven necessary by others. But at the time, they solved the problem we had: how to get the well, how to get the pipe into the hole to get the production. They created the slotted liners. They stood the pipe up and had a stand beside

it and they filled the entire pipe with paraffin wax because they didn't want oil sands into the center of the pipe. They had no way of cleaning out that well that was horizontal, so they filled the pipe with paraffin wax, shoved it into the drilled hole and then steamed the paraffin wax out. No company in their right mind would do it that way now, but it was just... some of the innovation was little stuff and some of it was big stuff. But it all worked to make that project move ahead.

PMB: Well thank you very much for this interview. It's been a lot of fun and you've provided a lot of very important information. It's been great, thank you.

ROTTENFUSSER: Thank you.

[END OF INTERVIEW]