MARK RUSCHOWSKY

Date and place of birth (if available): Shaunavon, Saskatchewan

Date and place of interview: Cold Lake Oil & Gas Galleries at the Cold Lake Museum

Name of interviewer: Peter McKenzie-Brown

Full names (spelled out) of all others present: Peter Tombrowski

Consent form signed: Yes

Initials of Interviewer: PMB

Last name of subject: RUSCHOWSKY

PMB: I'm talking to Mark Ruschowsky who is, well I guess your current title is Field Operations Superintendent?

RUSCHOWSKY: That's correct, yeah.

PMB: At Esso's Cold Lake Project. Mark, I did a major project of the Province on sort of the history and development of the oil sands in Alberta a few months ago. And, it involved going into archives. It involved going everywhere. I found very little about the story of the Esso Cold Lake facility.

RUSCHOWSKY: Oh, really.

PMB: I found a little bit and of course, I've been involved in the... I worked in the oil industry from 1977 for a long time. And, so I remember a little bit about the development. But, I really want you to help me with that because that's going to contribute a lot to my discussions over the next couple of days. So, I'd like to begin by asking you to tell me about your career. What's your background? Starting with when you were kid, where you were born and so on and just bring me up to the present?

RUSCHOWSKY: Sure. So, I grew up southwest Saskatchewan in a little town by the name of Shaunavon and rural, grew up on a farm and really didn't think much about the oil industry until probably in my teens when I noticed that there was some oil development down in the southwest part of Saskatchewan. It was all conventional oil and production. My thoughts at that time were that I liked the outdoors and I was going to be farmer. And, in the 80s and even before that it was very clear to me that that wasn't a viable option. I grew up in a family of nine kids. Five of us...

PMB: And, you only had one farm.

RUSCHOWSKY: Yeah, only one farm. Five boys and it was very clear very early that if I wanted to make a go of it and make a family that it was going to have to be a different career. I actually tried a little hand in the broadcasting industry. For three or four years, I was a morning DJ and I was a play-by-play person for the Swift Current Broncos for a season. And, loved that but the paycheque just didn't make it.

PMB: Really, you actually called the games?

RUSCHOWSKY: I did, I was the play-by-play guy for the Swift Current Broncos. And, my future brother-in-law convinced me to go into engineering in 1982 and I graduated from the University of Saskatchewan in 1986. And, I still didn't have a clue about what I wanted to do.

PMB: So, you actually were 22 years old before you went to university.

RUSCHOWSKY: Yeah, graduated when I was 26, yeah. So, one of the more mature students at university at that time, not the most mature, but I was driven to succeed. And, I knew what I wanted to do to be an engineer, didn't have a clue that it was going to be in the oil industry at the time, to tell you the truth. In my fourth year, as is typical now, I think they start a little earlier these days but when I was in fourth year the companies came calling about November, if I recall. And, they'd have some on-campus interviews. And, I got a call to do a second interview in January of 1986 from Imperial Oil. And, I flew to Calgary and got interviewed by the facilities lead at the time. And, I thought I was applying for a facilities engineering job. And, I got a letter I want to say maybe a month later, saying that I was accepted. And, to show up in June of 2006 and I did.

PMB: You meant 1986.

RUSCHOWSKY: Oh, yeah 1986, yes. And, I expected to start as a facility engineer. In fact, the first day I got told I was going to be one of the reservoir engineers working on the cold lake project. And so, yeah, it didn't matter to me I was interested in any kind of engineering. So, that was the kind of start, how I got in. It wasn't...

PMB: So, when you moved to Alberta from Saskatchewan you went to Calgary?

RUSCHOWSKY: Yes, I did. I started there. And, at that time, the Cold Lake Project consisted of a pilot. Actually, two pilot locations; one being the A Pilot which is currently shut-in and the other one, Leming. And, we had just recently started up the first few phases of our commercial development at that time. We started commercial development in 1985. And, I had been assigned to one of the commercial sites as the reservoir engineer support person, a team of four people working with two other, what was called at the time, Pad Engineers and then a senior lead person to mentor us along. And so, what my job at the time consisted of is, developing steaming schedules for the wells. And, the process of timing steam in to the wells and the amount of steam and how long the cycle lasts before it needs steam again is quite a complicated process when you're dealing with

hundreds of wells that all need to be steamed at the right time. And so, I was given the task of developing a steam schedule and maintaining it for...

PMB: Did you use computers; they were fairly primitive in those days, very primitive.

RUSCHOWSKY: The way we were set up, there was not an engineer that had a computer in his office.

PMB: No?

RUSCHOWSKY: No. We had a shared computer room. So, one of the few activities that took place on a computer was steam scheduling. Most of the other calculations were done by hand, on paper and with a calculator.

PMB: Wow.

RUSCHOWSKY: At the time, and you would bump a spot on the computer for the more complicated computations. That's the way it worked when I started with the company. At the same time, for the complicated simulations, we'd have dedicated computers for that kind of activity. But, the regular reservoir engineering activity, no, I wasn't assigned a computer until 1988, I believe. Two years after I started. It was quite an interesting experience.

PMB: That is funny.

RUSCHOWSKY: I was reflecting on that a little bit as I drove up here, just kind of over the last 26 years how things have changed. And, I do remember doing a relatively simple calculation, a present value calculation which involves a number of series of calculations. I remember filling up half a pad of engineering paper and with my calculator. And, I do that right now in probably 10 or 15 minutes on an Excel spreadsheet on my computer. So, it is quite interesting what has happened over the years. So, that's where I started in the oil industry. At the time, I would suggest that steam scheduling was considered to be one of the more junior positions.

So, I did that for two years and we actually made the move to have most of the engineering staff move to Cold Lake in 1988 and just after I got my first computers, actually. Up to that point, we had contact engineers in Cold Lake and those contact engineers would be responsible for everything. They'd be a contact person for operations and then they would relay their requests down to the engineering staff in Calgary. And, we'd be running off calculations on whatever they requested of us and giving back answers that they can relate to operations. Now obviously, they were also doing some of the engineering themselves. But, it was really a funnel point for the engineers in Calgary. In 1988, we decided that we wanted the full complement of support engineering staff in Cold Lake. And, I was part of that one of the first few that came in that first wave of people in September of 1988.

PMB: First, what was your reaction to moving to a small town?

RUSCHOWSKY: Trepidation, I would say.

PMB: Because, you had started on the farm and moved to a biggish city and now you're going to a small town.

RUSCHOWSKY: So, mixed feelings. I think I was looking forward to smaller town lifestyle again; more of the rural lifestyle again. Trepidation on two fronts: one is this is northern Alberta, in the bush; a whole lot different than southwest Saskatchewan on the prairie and so, a whole different culture. And, I had known that because I'd taken several trips to Cold Lake being stationed in Calgary, I had gone up to Cold Lake several times. So, the fear was all around, "Am I ready for the culture experience that's part of Cold Lake?" And, it is a little bit different up here. And, so yes, I was married and brought my wife up and I'd say it was... the first day up here, my wife cried actually because fear of the unknown. And, I would say that it did not take us long to realize this was like southwest Saskatchewan, Shaunavon Saskatchewan.

We quickly... I'll tell you a little bit of a funny story. We bought a house when we came to town and it didn't have a backyard and we had planned on having kids in the not too distant future, so I built a fence around the backyard. And, I built it on the weekend and the next Monday, after the building project, I'd say 75% of the people at work were commenting on how straight fence was and what colour it was and so on. So, it quickly made me realize this is small town. Everybody's your neighbor and they accept you and they want to integrate you into their community. And so, I think that was the first step in making me feel comfortable. That this was the place I wanted to live, right. I have had lots of opportunity to leave Cold Lake and I've actually scratched my way back to be able to be here for 23 out of the 26 years I've worked for the company, because I love the area, I love the place, my wife loves the place. And, we've really become used to the lifestyle and we love the people here.

PMB: Before we leave this, when did you marry and how did you meet your wife, and her name?

RUSCHOWSKY: So, I met Heather as she was attracted to the DJ.

PMB: It wasn't a play-by-play thing.

RUSCHOWSKY: Yeah, she didn't realize how much I made apparently. But, no, we met. Her family moved to Shaunavon and that's where I started my radio career. And, we met a party, right. And, got to know each other and I'd say established a bit of a relationship. She actually is younger than me but went to university before I did. And, I had known her brother actually before I knew her. And so, I went out four years with her before we got married. So, we got married in 1985. It was partly due to her having gone to university and her brother had convinced me to go to university as well.

PMB: Any kids?

RUSCHOWSKY: We have five kids.

PMB: Oh, my Lord, and their names?

RUSCHOWSKY: We have Olivia who is 22 years old. We have Kathleen is 18. We have Veronica which is 13. We have Caroline, 11 and Joseph, 9.

PMB: Thank you.

RUSCHOWSKY: Yeah, we have a full range. Our oldest one is married.

PMB: So, now you're in Cold Lake and you absolutely love it.

RUSCHOWSKY: Yes.

PMB: And, you're telling me your career a little bit. So, continue from there please.

RUSCHOWSKY: Sure. So, I'm coming to Cold Lake, I think we started to establish a different sort of way to steam schedule and assess reservoir engineering and optimization opportunities for wells. And, part and parcel of that, I played in a role in developing... I actually developed the first best practices for how to operate CSS wells. So, the plot line was in 1988, really inherit the same sort of steam scheduling role that I had. By 1990, we'd had already developed that role to be one of a very senior position, really be the focal point for optimization of the wells on a day-to-day basis with really senior simulation support from Calgary. And so, that's how the story line goes is I spend the next two years in developing that role and developing some of the practices. Ultimately, the best practices early in my career but developing those best practices with some of the more senior reservoir engineers of the day. I'll mention their names because they were significant in the development: Rick Gallant...

PMB: Oh, I remember Gallant.

RUSCHOWSKY: You know Rick Gallant?

PMB: Yes, isn't that something, from a long time ago.

RUSCHOWSKY: Shane Stark, Mark Taylor; that bunch of people were part and parcel of developing those strategies in the early part of the commercial development. And, the five of us I would say worked very, very closely with some senior folks in Calgary to kind of refine those practices over that period of time.

PMB: Quick question, is Rick living here now?

RUSCHOWSKY: Rick has moved on. He's moved through various positions. He's actually in Nigeria as a senior project manager.

PMB: For what company?

RUSCHOWSKY: For Exxon Mobil. So, as you probably know we're affiliated with Exxon Mobil.

PMB: Well, isn't that neat. Well, gosh, that's a name that just came out of the ancient past. I'm sorry, and then continue to the present.

RUSCHOWSKY: So, this is about 1990 and by this time, I was a more senior reservoir engineer. In 1991, I moved into a research lead role at Leming. So, at the time, we were using Leming and their wells as a way to test some of the different technologies that were trying to develop at the time. Things like, steam flood, different sorts of steam flood patterns, injector only wells, those are the two primary technologies that we were trying to develop and variations of those things. And, at the same time, we were trying to test the waters in a different zone than we would be producing out of 4CSS. In the Grand Rapids we were trying primary production. So, no steam, use a pump directly in to the un-steamed reservoir and produce as much as we could out of the reservoir; a screw pump. So, me and a small band of technologists and one very dedicated operator were running a number of different pilots for the next two or three years during that period of time, trying to develop this technology. So, that was the early 1990s.

By, 1994 or 1995, we kind of rolled the research group back into Calgary because we had done most of the testing part of developing those technologies, the hand-on stuff. And, I had then move back into the reservoir engineering group as the senior lead for the group in 1995. And, it was then that we wrote the best practices and started to develop those a little bit more firmly. And, so I spent the next two or three years as the senior lead for the reservoir group up here. And then, I moved onto the facilities. I finally got my facilities job in 1998 I think it was? I became the leader of the facilities group in Cold Lake. A group of about 22 people, and I was responsible for repairs of the facilities, minor modifications, operation of the plants, chemical inhibition, corrosion, all that sort of stuff, right. So, I spent about three years in that group as the lead. And then, I got yanked out of here for the first time in 2001 and went to Calgary and worked as the production best practices lead for Imperial Oil. In that role, I was the primary contact with the global Exxon organization to understand what best practices they had that we could use and apply to our operations; not only Cold Lake but the rest of the Imperial operations in the upstream. I also got my first shot at operations superintendent at the time.

We have a Quirk Creek facility, which is a sour gas facility plant. We had sweet gas operations in and around Medicine Hat. So, I was responsible for those two operations, right. It was actually quite a short stint in Athabasca by mid-2003, I think the company realized that they had taken more of the senior people out of Cold Lake much too quickly. Shane and me and Rick Gallant and Mark Taylor have all left the organization, as well as some of the more senior operations staff and some of the more senior facility staff as well. And, I think the organization was starting to realize that they were suffering a little bit from a lack of mentorship. So, when I was asked to come back to Cold Lake in 2003, I quickly jumped at the opportunity. So, I came back in 2003 as the technical manager. At the time, I was responsible for reservoir engineering, facility engineering, sub-surface engineering, controls engineering, at the time. So, a lot of the people I used to work with, now I was responsible

for their work. I spent three years as the facilities, or sorry, the technical manager. Which, during the course of that period of time it morphed into a split between facilities and sub-surface.

PMB: You lost your facilities job?

RUSCHOWSKY: I lost... well I actually lost my sub-surface job, I retained the facilities part of the job and then an opportunity came in operations to be the maintenance superintendant. I spent two years in that capacity and then it was in 2008 that I became the field operations superintendent. So, I've touched a lot of parts of the organizations within the last 26 years. I think I started to appreciate how dependent bits and pieces of the organization are on all those support organizations as well as the operations are and the business. It's given me a real appreciation that the business does not run by running pump jacks along, or doing reservoir engineering alone, or keeping the facilities running efficiently. But, it's safety, it's environmental, it's the whole range of support organizations; financial support that really are required to really get the most out of the business. It's taken me a lot of that career to realize how functionally diverse an organization really needs to be to survive in.

PMB: Terrific. Boy, what a great summary. You got a lot into about ten minutes. As I've told you, I've had a lot of trouble getting information about how the Cold Lake Project developed. Here's what I do know. That the original ideas came from, it would have been an Exxon project in Venezuela and that that was tested out at May and then later at Leming. And, it became cyclic steam stimulation. Do you know about that and can you help provide me with more information on that?

RUSCHOWSKY: Well, here's a high level picture of what I know. We acquired the leases in the 60s. Actually, the very first piloting we did was at the Ethel Lake site, a very small pilot facility before May came along.

PMB: What was it called?

RUSCHOWSKY: It was Ethel Lake. So, if you've entered...

PMB: So, I could just call it the Ethel Project.

RUSCHOWSKY: Yeah, the Ethel Project, yes. So, if you've talked to, I believe Archie was around in those days. I don't know if you've interviewed him yet.

PMB: Tomorrow.

RUSCHOWSKY: Archie, yeah okay. So, he may be able to provide you a little bit of context about what was going on. My knowledge base has been one of, we tried various different techniques of putting steam into the ground and trying to produce back the well during that period of time before we really jumped in, I'm going to say, with both feet into the main pilot. We used primarily... I'm going to say, the pre-cursor to CSS from my knowledge. I know did, I'm going to say late 60s, early 70s timeframe where we're doing the main pilot. In the early to mid-70s, we developed the Leming pilot and during that period of time I know that we did a lot of different piloting in the very early

pads that we had at Leming. Ranging from water displacement, hot water displacement, some flooding, a bunch of different sort of experimentation. My knowledge base is, I don't know what all the details are around Ethel and May reservoir experimentation. But, I do know that we had quite a bit of early experimentation at the Leming pads where we tried those different sorts of techniques. By the time I came along, I saw the write up of some of the early piloting techniques at Leming but was never actively engaged in them obviously, because they were run in the 70s. But, I did see some of the summaries of how unsuccessful, I would say for the most part, the non-CSS pilots were.

PMB: Now, I think it was '77 or '78, and I'm sure you know this, it's a legendary story. Roger Butler was here and he arranged to have that horizontal well to use as a production well. First horizontal well built in Canada.

RUSCHOWSKY: Yes, that's right.

PMB: Well, there were vertical wells that steamed hole...

RUSCHOWSKY: Right.

PMB: ...or steamed the formation. And, his results, I've read some of his material say basically, that it looked as though it was a successful idea. And, he was very encouraged with what became SAGD, or Steam Assisted Gravity Drainage.

RUSCHOWSKY: Yes, yes.

PMB: And yet, to this day, as far as I know Imperial has not used SAGD on this project.

RUSCHOWSKY: Right. Yes.

PMB: Somebody told me it had to do with reservoir characteristics?

RUSCHOWSKY: Yes, because that's very much...

PMB: Can you explain that to me?

RUSCHOWSKY: Sure, sure. So, as you can appreciate as the name suggests, Steam Assisted Gravity Drainage relies on a fairly clean reservoir for two things to happen. One is for the steam to access most parts of the reservoir and two, for there to be a fast drainage rate of the oil down to the producer. As you probably know, the current design of SAGD is two horizontal wells, one drilled over the other and one vertical above the other one. So, in a reservoir like that which is north of us, that's in the McMurray, in the oil saturated part, the McMurray you've got exactly that combination. You get high oil saturation, high vertical permeability, not a lot of clasts and disruptions to the reservoir. So, non-sand parts of the reservoir, right. So, in that type of reservoir it works great. Our reservoir, it works. I mean, we've demonstrated that. Roger demonstrated early in his piloting days and we have done a number of gravity related experiments since then. Not, I would say, exactly

SAGD. But, they have demonstrated that will work in our reservoir. What we have seen though is that the reservoir simulation and actually, more recently, some of the industry people around us that are trying to do SAGD in the Clearwater have basically validated our results as that for our type of reservoir. CSS is superior. It's not that SAGD wouldn't work. SAGD is economic but CSS is more economic in this kind of reservoir, because we do have different parts of reservoir that are not connected quite as perfectly as maybe what we'd see in McMurray, north of us, where it's exclusively SAGD as far as I know.

PMB: Great. Before we continue, this story I recall about Esso acquiring it's... it has the best part of the Cold Lake oil sands deposit. You have absolutely got the prime sands.

RUSCHOWSKY: We do.

PMB: Can you explain to me how that happened and what were the years? I seem to remember it was 1960 or 1962, but I'm not sure.

RUSCHOWSKY: Yeah, and you know what, I mean that part of the history is... I could find it but I don't know it off the top of my head to tell you the truth. It is 60s vintage and I don't know all the history about why they chose the location that they did. All I know is that, they did enough investigation to determine that the leases that they eventually got were the very attractive leases that they were after, right. And, how and why they chose that and whether they explored further enough to determine that these were the best. I don't know that kind of information. That's kind of before my time. And, I've only done some I would say some very sparse reading on that subject, only to know that that's kind of the timeframe.

PMB: Well, let me see whether I can add what I think is relevant and maybe accurate, at least partially accurate information.

RUSCHOWSKY: Yeah, yeah.

PMB: That at one time there was a large river formation in this area and it formed a deep bed in the... and then that later filled it, maybe even during the...

RUSCHOWSKY: Sure.

PMB: ... that later filled in with sands and gravels and that kind of things.

RUSCHOWSKY: Sure, exactly.

PMB: So, you had a very deep, deep formation full of sand and gravel and other stuff. Which eventually, into which the bitumen moved... migrated. It's my understanding is that Imperial's genius was to find the deep parts of that old river bed where the formations were deepest, where they were thickest and they would've been the richest as well.

RUSCHOWSKY: Sure, I mean, I think we clearly understood early in the process that the depositional on environmental is one of, sort of incised valley type deposits where you're going to have very thick deposits. I don't think we understand early in the 60s that they weren't as narrowly deposited as we ended up finding out. In fact, I would suggest that we even got some learnings as late as the 1980s where our view of how widely dispersed this bitumen was, actually we realized that it wasn't quite as widely distributed and not as thick and generous a resource as what we maybe thought to begin with. So, I would say that yes we did understand that there was a big resource. Did we did not delineate it or find the edges of it as well as maybe what we thought we knew it to be? But, I can say that the depositional environment is one of a valley and a fill of gravel and sandy type deposits. And then, another flooding environment, and then another fill on top of that where you've got a valley filled with a good reservoir environment, and then an non-reservoir layer on top of it, another valley on top of that. That may be as good or better or worse than that. And, these are discontinuous reservoir units that may be all within the Clearwater. So, that is what we understand right now to be the depositional environment.

PMB: One of the reasons you were successful in acquiring these properties was that it was... well first of all, you had the restrictions on information that you had. But also, of course, at that time nobody much cared about oil sands.

RUSCHOWSKY: You are absolutely right. I mean, that is, I think Exxon and Esso were one of the first that really understood the prize that was there. And, understood there were some potential technologies to exploit. I think that's really the case, we're really a decade of anybody else in this area because of our ability to, I would say, leverage on some of the other places within the Exxon/Mobil circuit that was using a like or thermal type process.

PMB: Any information about the Venezuela? It seems to me that there was a connection because Exxon had an operation in Venezuela in the ultra-heavy oil sands there. And then, it took that steam technology and tried it out here.

RUSCHOWSKY: Well...

PMB: I think that was the connection.

RUSCHOWSKY: Well, again, you might want to verify that. My understanding is that we actually used the steam flood learnings from California to apply to Cold Lake.

PMB: Oh?

RUSCHOWSKY: It was actually us, because I know that we sent one of our senior reservoir engineers down to Venezuela before they set up the Venezuela operation. So, I think it went the other way. I actually think that we used some of our technology developed in Cold Lake to apply to developing the Venezuela field in a later time. So, you may want to...

PMB: I'll check my source.

RUSCHOWSKY: ...verify that, that sort of flow. I mean, a guy like Bob Peterson would know that for certain. Bernie Reilly is one of the, I don't know, he was the senior reservoir engineer over a long period of time.

PMB: Where is he located?

RUSCHOWSKY: As far as I know, the last I heard of him he's living in Edmonton, Alberta.

PMB: Oh, really?

RUSCHOWSKY: Yeah, so.

PMB: Okay. I will mark him down. We'll get in touch with him.

RUSCHOWSKY: I know he was actually sent from Imperial Oil down to Venezuela to support that project.

PMB: He was heavily involved in Cold Lake?

RUSCHOWSKY: Very heavily involved in Cold Lake.

PMB: Good, yes. Thank you.

RUSCHOWSKY: He will be able to verify that flow and probably knows more around the...

PMB: The geology?

RUSCHOWSKY: ...well, probably more around the early 60s and how we developed and to what extent we knew the in-situ capability, I'm going to say, of what was there.

PMB: Great. So, that clarifies a lot of things. The basic system that you're using here is CSS. Can you give us an outline of how that developed?

RUSCHOWSKY: Sure. I think how we developed that is we recognized from the California experience that in order to move the bitumen and make it flow at any appreciable rate. We had a number of samples that showed us that the bitumen in place was as viscous as peanut butter. So, it's not going to move. So, some of the steam flood experience from California said, "Well you can enhance rates." In that case, we are talking about heavy oil and steam being used to enhance the flow of heavy oil. So, I think we used that experience to say, "You know what? Let's apply that to Cold Lake." I don't think we knew exactly who we were going to do that to begin with. Using the California experience would have told us, well let's try to push bitumen from one well to the next well. Well, that doesn't work here because we quickly realized that steam doesn't go into the reservoir at any appreciable rate. The bitumen is too viscous even to allow steam to flow past it at any appreciable rate. So, I think it was quickly realized that we're going to have to do something to

heat the bitumen up in the well itself and somehow produce it back to its own well. That was discovered, I'm going to say, relatively early in the process. It was at that point, that the cyclic part of the process was understood that it was a must. That we were going to have to go through heating up the bitumen near the wellbore, because there was no way we're going to push it to the next well over. And, bring it back to its own well and go through a series of heating up more bitumen and bringing it back to the well itself. That's where the whole concept of cyclic steam stimulation started. It was a recognition, as I said, about the impact of heat on viscosity in reducing it. The fact that, steam doesn't interact very well with the reservoir in terms of mobility, moving it through.

PMB: So, you can't push it. You have to heat it and then pull it.

RUSCHOWSKY: Yes, that's right.

PMB: Heat it up and then suck it up.

RUSCHOWSKY: That's right. That's exactly right, yes.

PMB: One of the questions that Peter and I were talking about on the way up here today, somebody that we spoke to said that in some of these reservoirs, he was talking about SAGD, the heat will stay underground for quite a long period of time?

RUSCHOWSKY: Oh, yes.

PMB: Is that your experience here?

RUSCHOWSKY: Absolutely.

PMB: Can you talk a little bit about that, please?

RUSCHOWSKY: Sure. Well, so let me talk about it in these terms. When we put steam into the ground it's typically to start with a month long process of putting steam into the ground on the very first cycle. We will produce back bitumen for three to four months after.

PMB: Really?

RUSCHOWSKY: Yes. So, that's the process on the very first cycle. What we know is after that period of time, at the end of three to four months, the reservoir is still going to be probably 60 degrees C or warmer. We have to stimulate the reservoir again. And, I'm going to say, we know that there's still some heat left in the reservoir after four months.

PMB: After four months of production, it's still 60 degrees Celsius?

RUSCHOWSKY: Yes, yes.

PMB: Really?

RUSCHOWSKY: Yeah. So, second cycle we will put in a little bit more steam. Because, you can imagine now we have produced out some bitumen and steam will go into that part of the reservoir that was produced a little bit easier. And, what we want to get is steam to go into parts of the reservoir that it hasn't contacted yet. So, the process is one of increasing steam volumes to be able to reach out a little bit further every time to get a little bit more of the bitumen contacted. We will go through a series of 9, 10, 11, 12 cycles in some cases for some wells. And so, that last cycle depending on the steam volume that you get in there. We will steam for four to six months and we'll produce for three years. And, at the end of that producing, you'll have parts of the reservoir that are at least 60 degrees C. And so, they'll maintain that temperature for some time.

PMB: Now, after you've gone through that many cycles of CSS, what percentage of the oil in place will you have recovered?

RUSCHOWSKY: At the end of CSS, we're probably in the 25% to 30% of the oil recovered, in that range.

PMB: Is that the end of the?

RUSCHOWSKY: No. Then we start to use some things that we worked on when I was a youngster.

PMB: Oh, okay.

RUSCHOWSKY: We now know that all of the experiments with in-fill wells has paid off and we'll drill wells between the existing wells that have been operated. And actually, we were going to use some of the horizontal technology to be able to do that. Instead of drilling, one well for each in-fill location we will put a horizontal well along the length of a number of those original wells and be able to distribute the steam along that horizontal well to be able to support the nearby vertical wells.

PMB: So, you'll be steaming through the horizontal wells and then sucking it up through the vertical wells?

RUSCHOWSKY: Yeah. The way the process works to begin with, as I talked about this is, if you're real successful you will have placed that horizontal well in the place where the steam didn't get to. And, the beginning part is, steam doesn't go in very easily into that reservoir. So, you also not be able to push very easily that bitumen to the surrounding wells. So, typically the first process is, you put a fair amount of steam into that reservoir to be able to make sure that most of that bitumen is mobile enough to move then next door to the producer. Then, you go through, I'm going to say, a cyclic process of steaming the in-fill wells while not producing. And then, allowing that peat to do its job and then the vertical wells that were originally there will go through a production cycle. We're starting to understand that the process migrates to one that is actually a displacement like process and allows us to get the...

PMB: I'm sorry. I didn't understand that sentence.

RUSCHOWSKY: The first in-fill cycle, I'm going to say, is more like a CSS cycle except it's steam into the in-fill, production from the vertical well.

PMB: Okay, so steam into the horizontal well?

RUSCHOWSKY: Yes, yes.

PMB: Then producing the vertical well?

RUSCHOWSKY: Right. As we start to establish a good connection between the horizontal well and those producers. We start to migrate to a process that is more like a displacement type process where we are actually continually steaming...

PMB: Pushing.

RUSCHOWSKY: ...yeah, the horizontal well and we are liberating oil toward the vertical wells.

PMB: So, you're actually pushing. All of a sudden you're pushing the oil out.

RUSCHOWSKY: I would say that the concept of pushing is probably not very accurate. It is steam rising, some gravity drainage effects. And, moving the oil toward the producers through a combination of some displacement, and some gravity as the steam reaches the top of the reservoir, and contacts bitumen on its way there, and starts to drain toward the producers.

PMB: Is this a little bit similar to SAGD?

RUSCHOWSKY: It's got, I'm going to say, some components of SAGD.

PMB: In the sense that you now have the steam chamber from the horizontal well.

RUSCHOWSKY: Yeah. It's starting to grow and it's starting to intersect the chamber. The original steam chamber that was created by the vertical wells, right. And so, I would say not completely like SAGD. Because, SAGD is a real separation of steam and liquids and really dominated by gravity, this has got some gravity effects but it's also got some displacement aspects to it as well. So, it really is a different sort of process than SAGD. It really is.

PMB: That's the second stage.

RUSCHOWSKY: Yes.

PMB: Now, I want to hear you tell me that at some point you get 90% of the oil out of the reservoir.

RUSCHOWSKY: Well?

PMB: Did that ever happen?

RUSCHOWSKY: No, not yet. But, we certainly are working... Well, so me having come into the process when we thought the recovery was in the teens and having seen it grow to 30 plus percent and 40 plus percent, because we've started to apply the technologies that we've sort of dabbled in and sort of experimented with. Leads me to believe, we're a long way from stopping at 35% - 40% recovery. I think there's lots of potential to develop the different methods. Optimizing the steam flood part of the operation to the point where you're going to get the 70% recovery. 90%, that seems a little bit on the...

PMB: Optimistic.

RUSCHOWSKY: ...optimistic side. But, I don't think it's outlandish to expect 60, 60 to 70 percent.

PMB: Some of the people I've interviewed have said that sometimes a SAGD facility can take out 70% already.

RUSCHOWSKY: Yeah, yeah exactly.

PMB: But, you're dealing with a totally different resource.

RUSCHOWSKY: A slightly different thing. And, I know that different people calculate their recovery differently, right. So, if you're talking about a recovery from a reservoir then it may be different than the recovery from the steam chamber that's being contacted by SAGD. Because, then you've got the challenge of the repeating pattern of SAGD and how the recovery between those well pairs actually works, so. Those are the challenges that we deal with, is within the steam chamber itself as long as you can reach out and get the drainage back to the well. That is usually the easiest part of the equation. The tough part is making sure that once you've established that steam chamber and of course, that's where the steam wants to go. How do you reach out to the places where the steam hasn't contacted? That's one of the biggest challenges for incremental recovery. Is finding a way to force steam into places where it doesn't want to go.

PMB: Anything else on new technologies? That was actually really exciting.

RUSCHOWSKY: Well, it is exciting, because I see a lot of the industry dabbling in solvents and even beginning non-thermal type processes where we're using different chemicals to reduce viscosity instead of the steam.

PMB: Are you doing any of that here?

RUSCHOWSKY: We're beginning to experiment on parts of that.

PMB: Have you ever tried fire?

RUSCHOWSKY: No. But, I remember part of a team that was looking at it. We never did get it off the ground.

PMB: Well, when I was with Gulf a million years ago, we did have a project nearby where we were trying fire flood.

RUSCHOWSKY: Oh, okay.

PMB: It didn't work, but we tried it. Boy, that's a fabulous review of the technologies. I understand that you weren't here and you were still off calling the play-by-plays. But, I'd like to ask for your understanding of Imperial's proposal for the big project in, I think it was '78 or '79, I think?

RUSCHOWSKY: Yeah, yeah.

PMB: Which would have included the upgrader and it was a five or six billion dollar, it was a huge project.

RUSCHOWSKY: It was a huge, it was a huge project.

PMB: And, of course, your understanding of how that collapsed. And then, how this project like a phoenix, rose from the ashes.

RUSCHOWSKY: Yeah, so here's my view of the world. When I came on the scene there was still a buzzing about the mega project and the stories about how Imperial kind of changed their direction around how they were going to invest. I think, the excitement was that there's a lot of oil there. And, in trying to uncover that and make an economic go of it was an exciting venture and just the magnitude of it was humungous. I think the reality of what sat in was, a huge exposure on a largely, unproven, commercial sort of project. I mean, we're still talking about experimenting at the, I'm going to say, commercial size of experiment, albeit, I mean Leming. But, I think people realize that the exposure of having a five billion dollar investment and all or nothing, it's like throwing your chips in the middle of the table.

My understanding was, the company kind of said, "I'm not willing to expose myself to that kind of risk." And, instead... because, the other thing is it doesn't allow the further development of the technology as you develop in a more of a phased approach. And so, that's why we actually adopted the phased approach. Why we still refer to different plants as phases one and two, because it's a kick back to the days where we made the decision to go from mega project and to a more a phased approach to scaling back the amount of investment that we're putting into this Cold Lake development. Such that, our financial exposure is smaller at a crack and also allowing for further development so that the next phase is going to even be run more economically favourably compared.

PMB: Now, I'm wonder whether you can help me. I'm trying to remember the name of the guy, in Calgary, who first proposed the idea of resurrecting as phased project? And, I've heard his name and I have it one of my interviews. Damned if I can remember it.

RUSCHOWSKY: I don't know.

PMB: When I find it, I'll send you an email.

RUSCHOWSKY: Yeah, yeah, okay.

PMB: Because, he came up with the notion in or around '83 or something like that. It was a very specific idea. We can't let the project go but this is a thing...

RUSCHOWSKY: It wasn't Howie Dingle was it?

PMB: Hm?

RUSCHOWSKY: It wasn't Howie Dingle was it?

PMB: No, it wasn't. No, it was somebody else. Now, I'm just trying to gather my thoughts here. There is another idea that maybe you might want to consider. The way the oil industry was operating from the GCOS plant through Syncrude, then of course the Imperial project and there were a whole bunch of other ones: Altasands...

RUSCHOWSKY: Yes.

PMB: Do you remember that?

RUSCHOWSKY: Yeah, yeah.

PMB: The thinking through the 1970s and really it continued, it kind of staggered along until it died in the early 90s. It was to develop the oil sands. You needed to make a project; throw a whole pile of money in and then it will all come.

RUSCHOWSKY: Right, yes.

PMB: Then what happened, and I think Imperial might have been the first to figure this out, is to say, "Mega projects aren't the way to go." And then, different things like OSLO and gosh, I've even forgotten the names of these other projects, mega projects. Which were getting all kinds of government, supposedly being thrown at them?

RUSCHOWSKY: Right, yes.

PMB: And then sometime, mostly in around in the early 90s, Canada moved to a Margaret Thatcher theory of economics. Do things that are economic now and economic without government support?

RUSCHOWSKY: Right, yes.

PMB: So, in other words, a big shift from mega projects towards intrinsically viable projects. Any comments on that, that's my theory?

RUSCHOWSKY: Well, I think you're right. I think there's less of an appetite for government to kind of put the "all in" approach as well in this industry. I mean, I don't think there's a... I mean, my theory is there's probably a little bit of drag on both sides. I think the Exxon/Mobil influence to Imperial Oil and we are a relatively conservative company at the end of the day, right. I think that combined with maybe what you're talking about in terms of government, maybe stepping away from its okay to spend a lot of money on these mega projects or support them. To one of a little bit more fiscal restraint. But, it came together maybe in the development of more of a phased approach. So, I don't know as much on the development of the government mentality, but I do see and still see the conservative nature of Imperial Oil and Exxon/Mobil in making sure that they do things in well-thought-out, disciplined manner. I'll tell you, I think the mega project idea for Imperial Oil was scary to them too, when they first brought it forward. That's what I believe. After, being part of the organization for 26 years, they do things very carefully, Imperial.

PMB: There was the theory, when this project was announced, do you remember that oil would be, by 1990, it would be $100.00 a barrel. By 1990, what was it? Was it $20.00 a barrel?

RUSCHOWSKY: Or, less.

PMB: Or, $15.00. It was really horrible.

RUSCHOWSKY: In the 1988 to 1990 timeframe, I believe bitumen net packs were like $5.00. So, maybe light oil would have been $15.00, I'm going to say, $15.00 to $20.00. And, we were...

PMB: And, they stayed really pathetic until the early 2000s.

RUSCHOWSKY: They stayed pathetic, right.

PMB: So, just imagine if you had put that five billion dollars into this plant.

RUSCHOWSKY: Oh, yeah, exactly.

PMB: You would've been underwater for decades.

RUSCHOWSKY: Maybe a dawning of the reality of oil prices put a little bit of sobering second thought on that big investment too.

PMB: So, in its way, the National Energy Program might have paid... it paid...that's only for Imperial.

RUSCHOWSKY: Yeah, exactly.

PMB: We've covered so much material. You've helped me understand this. The shift to best practices, now I remember when I was with Amoco which was in the late 90s, became a really dominant theme in the industry. Can you tell me a little bit about how that developed and how that's worked?

RUSCHOWSKY: I would say that Exxon/Mobil was one of the first to recognize that because they had operations of really diversity across different types of reservoir, production fluids, countries, different settings and different people, different backgrounds. By the 1990s, I think they started to recognize that getting people together and sharing that variety of experience to get together and develop a practice that crossed those borders and help each other out was starting to be recognized. I'd say from my, what I see from outside the borders, is I'd say that Exxon was one of the leaders in recognizing that developing best practices to be applied across a number of different things: from operating a reservoir, sub-surface practices, financial practices was really catching on in the 90s. I'd say, Imperial was quick to adopt that practice, maybe not so much as participating in the Exxon/Mobil sharing out to Cold Lake, because I think there was still a little bit of a barrier to say that stuff applies to Cold Lake. But, I'd say, "Use that as template to recognize the value of having a documented best practice to rely on."

My boss at the time, Eddie Luy was very much a proponent of, let's get best practices documented, vetted with the technical community so that we have something to add to and improve. So, very much with his encouragement I was developing those reservoir best practices. I would say since that time, we've really latched onto best practices from other parts of the Exxon/Mobil circuit and improved the best practices in Cold Lake and in Imperial, in general.

PMB: For the people who are using this document in the future and would like a snapshot of what best practices actually means, explain that to me, please?

RUSCHOWSKY: For the best practices that we're talking about and have been applied at Cold Lake. We're talking about things like: what patterns of steam work best. What volumes of steam per well work best. What are the limits on volumes per well. What sorts of cycle lengths are appropriate? What are the indicators of cycle length? How to manage design of casing. How do you manage the producing environment to minimize corrosion? Those are the sorts of things.

PMB: So, it's a summary of your experience and the tests. So, that people won't make the mistakes.

RUSCHOWSKY: Exactly. That's exactly right.

PMB: But, this also applied to safety?

RUSCHOWSKY: Yes, absolutely.

PMB: Or, the safety best practices?

RUSCHOWSKY: Absolutely, yes.

PMB: They were really best practices across the whole...

RUSCHOWSKY: Yeah.

PMB: To what extent were these proprietary, environmental best practices?

RUSCHOWSKY: I would say that the safety best practices were not so much proprietary.

PMB: Because, you wanted everybody to do this.

RUSCHOWSKY: Yeah, we wanted everybody in the industry to learn and...

PMB: Environmental?

RUSCHOWSKY: Environmental, I would say probably more in that category as well. Is, we...

PMB: They were not proprietary?

RUSCHOWSKY: They were generally not proprietary.

PMB: So, you would share them with Canadian National Resources up the road?

RUSCHOWSKY: Yes. I would say that is a fair statement, right. Yeah.

PMB: But, where you have a financial, where something gives you a financial advantage...

RUSCHOWSKY: Absolutely.

PMB: ... or a technical advantage, you're not going to share that?

RUSCHOWSKY: Yeah, that's exactly the way to describe it, is where there is a technical advantage by our know-how and our hard work and our simulation, no we're not going to share that.

PMB: If you did share that, there could actually be an accusation of collusion, couldn't there?

RUSCHOWSKY: There could be, yeah.

PMB: I'm theoretically, speaking. I don't know if that happened.

RUSCHOWSKY: Theoretically, yeah. But, not so much from that perspective, I think we want to maintain a competitive advantage from a supply cost point of view, from a value of stock point of view as well, right. So, that's really the approach that we take, is where there is a competitive financial advantage we want to hang onto that. We quickly realized that that safety and

environmental, those things... You view the industry as one entity when those sorts of things happen. It doesn't matter whether it's CNRL, Cenovus, Imperial, Husky, Shell, whoever. If they've got an environmental issue, it doesn't matter.

PMB: It affects all of us.

RUSCHOWSKY: Yeah, it affects all of us. We're all viewed with the same lens, through the same lens. The media will say, again, because the oil industry doesn't have their act together, right. So, it's in all of our best interests to make sure that we have practices that are at the highest standard with respect to protecting the environment and the people. I think for the most part, I see the industry here really jump onto that bandwagon quite well.

PMB: There are a lot of organizations within the industry that have been formed to share that information.

RUSCHOWSKY: Yes, there has. Yeah, exactly, right.

PMB: Just before you came in I interviewed Chris Holoboff, who is the head of the Museum Society and he's a high school vice-principal and just a really, really nice guy. But, he talked about the impact, from his perspective that Imperial had on the community. Imperial's involved with the high school. Imperial's involvement with charities, with the United Way, with one thing after another. As a 25 or 27 year, whatever it is, resident of... Is it 27 years?

RUSCHOWSKY: 26 years with the company.

PMB: 26 years with... and as a 25 year resident or so, thereabouts, of Cold Lake. What's your impression of Imperial's impact on the community?

RUSCHOWSKY: I would say very positive from a number of different aspects. The obvious one is, I mean, it's been a source of employment for the community and the contracting community that supports us for many, many years. That certainly has had some very obvious benefits for the lifestyle that people enjoy in this area. I think one of the things that I realize is when I go back to southern Saskatchewan is people don't realize the kind of life that they're able to live because of the oil industry, up here as good as it is. I mean the standard of living is absolutely outstanding for this area. And, obviously, Imperial plays apart in that, right. Secondly, it's the kind of impact that our employees have had on the community by way of, we very much encourage people to be part of charitable organizations, be soccer coaches, be people that help out in the community; so, from that perspective, very positive.

The specific one that I know that we've involved with, with Chris has been the high school partnership, the third one is an educational aspect to make people understand. I mean, when I grew up I didn't have a clue what you did in the oil industry. I think we're having a positive effect on the high school population by getting them education around what we out there and what part they can play. So, we try real hard to describe a career pathway for those folks to come in our organization.

And, we're making that relationship stronger every day. I know we're trying to get fourth class program as part of the curriculum. And so, we're just trying to do our part to make sure that the community fully benefits from us being next door.

PMB: You know that all of the exhibits in this gallery were made by the high school?

RUSCHOWSKY: I do. In fact, Imperial helped in building and putting this museum together. Some of our employees were very passionate about it.

PMB: Well, Chris Holoboff certainly was.

RUSCHOWSKY: He certainly is.

PMB: One last question. I always have a last question. In terms of government support and I'm talking about, you remember when the oil sands... the task force, what was it 15 years ago or almost 20 years ago now, really changed the rules for the oil sands business. It was part of that move toward making the industry simply competitive, a competitive sector.

RUSCHOWSKY: Yes. Sure.

PMB: Has government in that way been really positive? Has it been negative? Has it been neutral? And, give me your thoughts on government regulations as well.

RUSCHOWSKY: From a financial point of view, I would say that it's been fair. Why I say it in that way, is that from my perspective there's no free ride. There's a way of dealing with capital investment and maybe deferring some of those taxes just like anyone else as a personal, individual will be able to write off some the expenses against the income.

PMB: So, you are referring here to the Oil Sands Task Force.

RUSCHOWSKY: Exactly. I'm talking about that. Is that, I think it's been on the whole fair to both the industry and the people enjoying the results of those funds being funneled back in by way of royalties, to the people that enjoy the standard of living all across Alberta. So, my view is fair. So, if you want to see that as positive. Yes, I would say, it's positive. But, it's also not positive from the perspective of being a loser or winner in the game; it is positive for both industry and positive for Alberta as well. I think both have benefited from that relationship in a reasonable way. From a regulations point of view, I think the kind of regulations that are being proposed... I think Alberta's played a pretty good role of trying to take the wide ranging views and coming up with some reasonable solutions with respect to emissions controls, expectations. But, I think on the whole, most of us would see as reasonable. At the end of the day, yeah, we all want to. Industry does as well.

We all want to have as little an impact on the environment, on the people around. Have positive effects on all those things as we possibly can. And, I think having a facilitator to ensure that we're all

held to a high standard is their role. I think on the whole that Alberta's done a good job of doing that. I think they've played their role well, on the whole, right? Have they made some mistakes? Yeah, I think they have.

PMB: Is it reasonable to say that that is the kind of system that would logically work out? If you have a system in which the government owns the resource, wants to have it used but doesn't want to have basically voters pissed off at them. So, you wouldn't want social and you wouldn't want environmental negative effects. So, it's a good system for creating that kind of regulator.

RUSCHOWSKY: Yeah, it is. I think the involvement that industry has had in vetting some of those regulations and ensuring that the full understanding of those regulations, how they hit home, has been relatively good. I think the processes that the government have around reviews and pretty stringent reviews of projects to ensure that there are (a) positive benefits to the community, (b) no long-term negative impacts to the community or the environment is a pretty robust process. I think on the whole I think it benefits... it holds industry accountable and I'm supportive of that. I am very proud to work for a company that tries to do that, right. They are trying their best to do that. I think somebody facilitating and ensuring that there are cold eyes, is never a bad thing when you're trying to do it, right. Bringing a different perspective is never a bad thing. Sometimes, that perspective requires you to double think, even Imperial Oil's approach to how manage certain things. We, I would say, accept that responsibility to be held accountable to the cold eyes. And, I think industry should. I mean, as long as there are fact based decisions and not emotional ones, you'll always end up in the right place is my opinion.

PMB: I don't have any questions. Do you have anything else you'd like to talk about?

RUSCHOWSKY: I mean, not really. I think, in general, I think you'll find that the people in Cold Lake are quite supportive of us. It's interesting in the community that you live, is you've generated... I think we've generated some pretty positive emotions on the whole in Cold Lake. I'd say the further you get away from the nucleus, it's interesting that the perception is different. When you read in the papers what the perspective is, it seems to have a lack of that [P? hypocrisy?] and the database... based the opinion, that what you see in Cold Lake... For the people that experience it, it is quite a bit different I would say. To find a way to make all people understand what the balanced view of industry is, I think a challenge that we all have. In the industry, I mean.

PMB: Well, thank you very much. It's been a great interview.

RUSCHOWSKY: I appreciate.

[END OF RECORDING - PART 1]

[START OF RECORDING - PART 2]

PMB: I'm talking to Mark Ruschkowsky again. He's going to tell me a little bit something about an incident here called T-Pad. So, please tell me about that. It was a major incident. Tell me about the background and the then the outcome of that please.

RUSCHOWSKY: Sure, sure. So, T refers to a location. We have pad names and they refer to a grouping of wells. This one was called T-Pad. In 1995, we had a number of casing failures on that pad which resulted in a release of fluids. What we learned after, was that some of the environment that we were creating during steaming and production was creating a bit of a corrosive environment that ultimately led to the failure of these casing strings. I can tell you now that the long-term impacts from an environment point of view, both on surface and on the aquifers, are extremely minimal and is extremely limited to a small area.

PMB: Before you talk about that, what essentially happened is that casings, which separate the well from... they failed.

RUSCHOWSKY: Yes.

PMB: The outcome was sort of an explosion that's mostly steam and water.

RUSCHOWSKY: Yeah, a release of steam and mostly produced water. So, to talk about the design of the well to begin with is, you drill a hole in the ground, you run a piece of... a string of casing in there.

PMB: Basically, a string of pipe.

RUSCHOWSKY: Yeah, a string of pipe and then you pump cement down one side of the pipe and up the outside and then it sets up and now you've got a cemented string of pipe in the ground. And, there's cement... there is pipe, there is cement and then there's the reservoir. That cement prevents flow from coming from the reservoir to the surface. It cements the casing string in place. So, what happened was a corrosive, really a corrosive environment resulted in casing failing and a release of fluids in a section between the surface and the reservoir. And, that release of fluids came to surface and we ultimately killed those wells with heavy fluids and stopped the flow from coming to surface and ran bridge plugs in the hole to prevent additional reservoir fluids from coming to surface. But, it all resulted in a creation of a corrosive environment in the casing strings that ultimately resulted in them failing in this environment. So, that's the lead up to it. 1995, that's almost 20 years ago now.

And so, what did we learn from the incident? What we learned was that we have to control the amount of caustic in our steam. We learned that we have to control the environment even during the producing part of the cycle, during parts of the producing cycle. We learned that the type of casing design is important. We worked on different types of casing design, improved casing design. All resulting in a much more integral casing string and a lot, I'm going to say, practices that are lined up with knowledge that allow us to be able to operate with a greater emphasis on casing integrity.

PMB: So, the outcome of it basically was positive?

RUSCHOWSKY: Yes.

PMB: Long-term outcome...

RUSCHOWSKY: Long-term outcome.

PMB: ...because it could be repeated.

RUSCHOWSKY: Yes, exactly right.

PMB: Thank you very much.

RUSCHOWSKY: Okay.

[END OF RECORDING]