BRUCE SLEVINSKY

Date and place of birth (if available): April 3rd, 1950, Edmonton, AB.

Date and place of interview: July 31st, 2013, Enerplus Building, Calgary, AB.

Name of interviewer: Peter McKenzie-Brown

Name of videographer: Peter Tombrowski

Full names (spelled out) of all others present: Bruce Slevinsky

Consent form signed: Yes

Transcript reviewed by subject:

Interview Duration: 1 hour, 23 minutes

Initials of Interviewer: PMB

Last name of subject: Slevinsky

PMB: I'm talking to Bruce Slevinsky this morning. It's the 31st of July, 2013. Bruce has a long history in the oil sands industry, but has also done some other work in the Arctic islands, and so on. So today we are at the s of Enerplus in Calgary, and we're ready to go.

Bruce, would you begin by telling me a little bit about the early years, childhood, where you were born, when, so on?

SLEVINSKY: I was born in Edmonton, Alberta, April 3rd, 1950; lived with my parents there; went to school, and graduated early from high school because I had teachers who wanted to push me along.

PMB: Just wanted to get rid of you did they?

SLEVINSKY: I was just a pain to have around. I was always reading way above my grade level and getting into all kinds of trouble so they just kept trying to accelerate me along. So I ended up graduating at 16, going to university, and in 1971 I had my Bachelor's degree from Mechanical Engineering Department. And I'd worked, during the previous two summers, for Esso out in the field and in the head office, and they'd given me a job offer at the end of fourth year, and I turned them down.

PMB: Before we leave this, where were you born?

SLEVINSKY: I was born in Edmonton. And went to school in Hardisty, Fulton Place, McNally High School. I was in the first graduating class from McNally High School because it was just a

brand new school on River Bank. And I had great teachers. I can't imagine what life would have been like without them, but they were just wonderful people. They encouraged my interest in math, and science and kept me going.

I really wanted to go and be an aeronautical engineer. My parents didn't want me to leave town because they figured I was too young to be going off to the States to study aeronautics, so my dad persuaded me to go into mechanical engineering.

PMB: What did your parents do in Edmonton?

SLEVINSKY: My dad ran a plastics pipe factory, and my mom was the principal of the elementary section of the Correspondence School Branch; the Alberta government agency that provided remote training for Alberta curriculum to people that were travelling outside of Alberta. So she had students in Africa, and India, and all over the world.

And in the summers when the kids were back in Canada as expats, she would have summer camps for them, and bring them all together because they had basically done like home schooling, but out in the wilds.

PMB: So education was really a big part of your upbringing?

SLEVINSKY: Oh, my parents were just really keen that we should all be smart and go to school.

PMB: And then now continue that story into university.

SLEVINSKY: Well, university, for me, was just fun. I got through four years of engineering; I don't think I ever cracked a book it was just too easy. And as I said, the first year I didn't find a job. Second year university my parents wanted to get me out of the house and so my uncle, living up in St. Paul owned the local Coca-Cola bottling plant, and so I took over his house when he went on vacation for the summer, and worked in the Coke bottling plant, driving a truck, and picking bottles, and going out to Indian Reserves and, generally just being semi-useful; mowing the lawns and stuff like that.

Learning to work for $1.25 an hour convinced me that maybe university education wasn't such a bad thing after all. But second and third year university I worked for Esso, in the field. So I worked at the Dodsland Viking Waterflood Pool. It was just starting up. It's kind of a funny story because --

PMB: Okay, remind me where that is physically.

SLEVINSKY: Just outside of Kindersley in Western's -- it was a brand new waterflood back then. And when I came to work at Enerplus three and a half years ago, it's one of the properties that we own and operate, so I could tell people that I was there when it started, and almost 40 years later it's kind of a hard thing to admit. I worked out there on the prairie, cleaning wellheads and learning how to change stuffing boxes, and doing all that fun stuff.

The next year I worked in Esso's office in Edmonton, doing flare stack designs and all kinds of fun stuff with reservoirs. It was at the end of the third year, beginning of fourth year they offered me a job for when I graduated, and I turned them down. I decided I was going to try and academic career. I enjoyed being at university, and seemed to have a knack for the academic side of things. So that summer I went and worked for the National Research Council in Ottawa, in the fields and lubricants lab, and ended up working with a guy by the name of Clive Dayson, and he was a wild and crazy guy, and he was doing research on friction in outer space. So I ended up working on a big vacuum chamber and designing instrumentation for measuring friction and indentation of one metal into another inside this vacuum chamber.

Had a great time just spending the summer working with him. He ended up getting an American Society Mechanical Engineering gold medal for his paper that came out of that summer's worth of work. So it was very interesting. I had great fun. And then came back and --

PMB: Well, that must have been very appealing to your instinct to be an aeronautical engineer.

SLEVINSKY: It was. It was great fun. I was working on all kinds of interesting stuff. It was wild and crazy.

PMB: And you were only there for the summer?

SLEVINSKY: Just for the summer. And so I got to do some metal machining, and learning how to work inside vacuum chambers. The topic of research I was going to pursue in the fall involved plasticity, and it turned out that the metal failures in outer space involved welding under low oxygen conditions, low vacuum conditions, and it involved plastic failures of the bearings, so it all fit together. It was really great. And when I went back in the fall I started working on my degree, and I had all the course work, and my Master's thesis completed by the following September. So I basically killed off the Masters in a year, and written a couple of papers. I got hired on at the university to be a sessional lecturer for the following year.

PMB: Where were the papers published?

SLEVINSKY: I've got a list of them somewhere.

PMB: Technical journals I presume?

SLEVINSKY: Technical journals in plasticity and -- oh, gee, where was it?

PMB: It doesn't matter.

SLEVINSKY: It doesn't matter. It was a mathematics journal because it's basically a mathematics treatise, just solving equations in multi dimensions and it was, again, just easy stuff. My prof and I had a great time; we'd have tea every morning and discuss the day's research, and I'd go bang away at the computer and in the lab, and within a year we had everything done.

And that fall while I was working at the university, I applied to go to Brown University in Providence Rhode Island for a PhD, and got accepted, so I was all gung-ho to go. And then at Christmastime I got engaged to be married, so we put that off for 18 months. I figured I could head off and do a PhD in a year or two, and it wouldn't be a big problem, but I managed to get all my course work done in the first year, in 1973/'74, at Brown, and then they informed me that if I did get married I couldn't bring my wife back across the border. So I became a PhD dropout, and decided to change my career orientation.

But I got back to Alberta and it was the spring following the Arab oil embargo, and oil prices had gone up and the economy was in dire straits. People were being laid off and there weren't any jobs available. And so there I was, a couple weeks away from being married, I had no job, not much in the way of prospects. My wife had a teaching job in Calgary, thank goodness. So we could live in her one-bedroom apartment and I could be a kept man. I just kept sending out resumes, and applying to everything that appeared in the newspaper, which wasn't much.

And then out of the blue the week before the wedding I got this letter from Esso asking if I would come down to Calgary to do a job interview, and I just jumped at the chance. I drove on down, and it was the strangest experience. In 40 years of being in the industry I can't imagine anything like this happening today, or can't imagine that it happened then.

PMB: And the person who offered you the job was Bob Peterson?

SLEVINSKY: I came down to the Esso building and talked to the HR people, and they said well, only one manager here has agreed to talk to you, and it was Bob Peterson; he was managing the Cold Lake Heavy Oil Group at the time. And they said well, it's going to be short because he's only available over lunch. So we went to the Esso cafeteria, which was on I think the second or third floor of their old building, and had a sandwich, and talked over lunch, and at the end of 45 minutes he said well, Bruce, why don't you just go down to our research lab, and he gave me the address - it was in south Calgary just down by Chinook Mall - and talk to our lab manager, and see what happens.

So I went down and talked to Al Telford, and we had about a half-hour talk, and then he introduced me to Tom Wilson, who was an almost retired reservoir engineer, who was working on Cold Lake, and doing steam measurements, and he'd done electrical analyzer model studies of red water in his career, but he'd suffered a stroke and had periods where he would just black out, and so he was working out at the research lab, and Esso kept him there working until he retired. But he and I had a good chat, and at the end of the afternoon they said well, we'll see you here July 14.

And so I went back home, got married about a week later, two weeks later I was moved down to Calgary and working in the research lab, and I just was blown away.

PMB: Great story.

SLEVINSKY: I had no background; my Master's degree was in plastic anisotropy and applied mathematics. It just involved the study of a class of deformations where part of the deformation is controlled by elasticity, and the other part, the metal is actually flowing, but being constrained by this elastic membrane just before it breaks. So we studied things like the elastic and plastic expansions of spheres and shells, and as it turns out the biggest application was for containment of underground hydrogen bomb tests because the inside of the blast chamber is actually in plastic failure, and the outside is being constrained by the elasticity of the earth. It was kind of frightening to think that something as innocent as what I had worked on mathematically could be turned to such horrible use, but that's just the way it goes.

PMB: Now I'd like you to go from this part, just quickly go through your career because I know you were up in the Arctic islands, and you've done, I think, the East Coast offshore, and a number of other operations. Would you just quickly go through the different pieces of your career.

SLEVINSKY: Starting from the research lab or going back to that later?

PMB: Well, starting from the research lab, and just give me the quick bullet point version of that, and then I'm going to be asking you specifically about the oil sands work.

SLEVINSKY: Well, my first job at Esso was in the research lab working in the production research and technologies services lab, and the area I worked on was specifically on Cold Lake. And I worked there for --

PMB: So the Esso Cold Lake Project?

SLEVINSKY: The Esso Cold Lake Project.

PMB: And now this was in the early 1970s?

SLEVINSKY: 1974 through 1977.

PMB: Which is really when the project was still almost experimental.

SLEVINSKY: Well, everything at Cold Lake had been an experiment for 20 years, and in 1974 when I joined they were just opening up the Lemming Pilot, which was the first step to becoming commercial. And so I worked there for three years with Roger Butler, because he arrived the year after I did, and then I got spirited off into the downtown office because I accidentally learned reservoir simulation, and so I became a reservoir engineer. I basically ran through every asset that Esso owned on a major scale - Red Water, Golden Spike, Judy Creek - and then my last official act there was to highlight that we could do enhanced oil recovery C02 miscible flood, and then I went on (indiscernible) management. And then I became a team lead, and then a group leader, and then got moved back to be the team lead for Judy Creek until the C02 Miscible Project failed because of cost overruns associated with trying to get C02 out of Syncrude.

And so 40 years later it still hasn't happened. But we were just so far ahead of our time; if it had worked we would have been 40 years ahead in doing carbon sequestration in Alberta.

PMB: What, were you just piping carbon from Syncrude, was that the plan?

SLEVINSKY: We were planning to actually attach the C02 recovery units directly to the cokers at Syncrude and recover the C02 which was otherwise just being flared into the atmosphere, and has been for 40 years, and then put it in a 12 or 16-inch pipeline and pipe it down to Judy Creek, and inject it into the two pools there.

PMB: Did you build the pipe?

SLEVINSKY: The cost estimates had gone from a hundred million to over $700 million by the time the project was cancelled. When the project was cancelled a number of negative consequences occurred. We discovered that there were irregularities in the field, and so a number of people were fired. There were investigations, and the upshot was that a number of people had their careers damaged, including Barry Stewart, the field operations manager at that time. Barry got sent down to Ecuador to become president of Petro-Ecuador.

PMB: I interviewed Barry a few weeks ago. He did not mention that small fact.

SLEVINSKY: Well, I think that was what was being Barry getting sent down there.

PMB: He did mention going to Ecuador.

SLEVINSKY: He was going to be buried there forever, and it was only PetroCan hiring him to become either a senior (indiscernible) or president of the company that brought him back to Canada, but that was his way out.

So as a result of that, it was pretty evident that my career in Esso was over because too many senior people had had their careers damaged because of what had happened at Judy Creek, and so I left and became a consultant.

PMB: Now, before you leave that, at this time you were working with Roger Butler?

SLEVINSKY: I was actually working with Roger Butler only from 1975 through early 1978, so three or four years.

PMB: In a few sentences, what kind of person was he?

SLEVINSKY: Very jovial, but very, very driven. When he arrived he displaced Paul Andrews, who had been the Cold Lake Research Manager at the research lab. And I had worked for Paul for a year, and Paul was just told that he was moving downtown and he was being replaced. He didn't really

want to go, but that was what was happening. Livingston, the President of Esso, had had Roger as a prof and --

PMB: That was Jack Livingston wasn't it?

SLEVINSKY: Yeah. And he had hired Roger to do some work for him at the Standard Oil in New Jersey research lab, solving some problems of tanker scheduling, and Roger had done a great job at that, and he ended up working at the Sarnia research lab for Esso. And in 1969 he'd come up with this idea of doing thermal melting of crude, and gravity drainage, and he patented that in his first patent. And he kept working on Livingston because they had that personal connection, for five years before he actually got transferred to Calgary.

And at the time oil was very cheap; it was only about 2 or $3 a barrel, and it was very difficult for Cold Lake to reach economic thresholds. The first two or three pilots that they'd run over 20 years had never made a penny.

PMB: This is the period just before the Arab oil embargo?

SLEVINSKY: It was just before and just after the Arab oil embargo. The price of oil was very low, and the Cold Lake Project had struggled. With 20 years of research behind it with cyclic steam to get to the point where it actually made any money, it had been a negative cash loser all that time. But with what they'd learned over time, and the application of (indiscernible), and they decided to build the Lemming Pad or the Lemming Pilot, which was a major 40 or 50-well expansion.

This is an aerial photograph of the Lemming Pad. And it was the first time when they'd gone beyond single wells and single roads, and they were drilling nine or ten wells per pad off central pads; very modern in terms of concept, and drilling them in deviated well arrays, coming out as spiders from the central points, and they were doing the cyclic stimulation on tight spacing. And that pilot was the first one that actually made money.

PMB: This is Lemming?

SLEVINSKY: That's the Lemming Pilot. I was hired just at the point where they were starting that up. All the facilities were new, they didn't have oil leaking all over them.

PMB: What was your involvement in that?

SLEVINSKY: Well, as part of the Production Research and Technical Services Lab, we were in charge of running all the experiments at Lemming. The field operations guys actually injected the steam, produced the oil, and we came up with wild and whacky experiments to try and see if we could find out how to optimize it, how to make it better, and we did the wildest and crazy stuff.

My PhD had been studying fracture mechanics, and so they put me to work looking at the steam injectivity, because it was obvious that we were doing something there when we injected cycles of

steam, that wasn't normal. It wasn't just flowing out normally. And so I was able to put some diagnostics together to show that we were actually fracturing the wells, and we were generating vertical fractures, and the steam injectivity we were achieving was because we were actually fracturing the ground. And it was pretty easy. We measured the surface uplift; we were getting those pads, central pads there were lifting up a foot or two during each injection cycle. So it was obvious that mechanically we were doing something underground. And so the diagnostics I put together allowed us to actually see, and to map out the growth of the fractures, the extent of the steam zone as a function of time. And that was very interesting.

It was one of those coincidental thing -- I happened to have a piece of expertise, and they had a problem that just melded with it. So I ended up inheriting the problem, and then went to work solving it. And then we tried things like can we take advantage of the fracturing? So now in tight formations for gas and oil, the big thing is horizontal wells with multiple fractures.

PMB: Okay. Now I'd like to come back to that.

SLEVINSKY: Yeah.

PMB: I have one question. One person, and I think it was Harbir Chhina; I think he told me that Roger Butler had actually come up with the idea conceptually for SAGD back in 1969.

SLEVINSKY: Yeah.

PMB: You're aware of that?

SLEVINSKY: I was aware of his patent, and his theories. The stuff that he'd done in '69 was actually an outgrowth of what he'd done at a potash mine for Esso, and it involved, again, vertical drainage of potash. They would inject fresh water at the top of the formation and collect the heavy brine at the bottom of the chamber and just do the circulation, and in Roger's fertile mind he could see that transform into attacking oil. The way he explained it to me is his concept for all of this came from the coffee pot, the old coffee percolators, where you'd put energy in the bottom, it percolated steam and water to the top, it all condensed at the top, and then the water drained through the basket of coffee, and then you produced the coffee out the bottom. And so that was where Roger got his idea both for the potash mine and for the heavy oil extraction at Cold Lake or Athabasca.

PMB: There were three signatories to that patent, and I'm interviewing the only survivor.

SLEVINSKY: Yeah. But that was done when he was still in Sarnia. But he had fought for five years with Livingston and his connections with the Esso management in Toronto to get moved out to Calgary because he just had this vision that he could transform Cold Lake because all these years Livingston had been complaining that they were putting millions of dollars into research at Cold Lake and they hadn't made a penny yet. At the same time everybody working the cyclic steam stimulation was working to optimize that process full tilt, and so it became a head-to-head battle when Roger finally arrived in Calgary.

PMB: Now, you were talking about learning that the reservoir at Cold Lake was fractured.

SLEVINSKY: In order to get steam to go in the ground they just kept cranking the pressures up higher and higher, and eventually they would get to a pressure where suddenly the steam would go away. And when I actually did the analysis of the pressure records and the injection records it was pretty obvious that they were actually growing fractures. And whether they knew it or not, the process that they'd undertaken to do cyclic steam stimulation at Cold Lake involved fracturing the reservoir. People had all kinds of arguments as to what the shapes of those fractures where, whether it was fuzzy, or diffuse, or single plains, but it really didn't matter because basically the only way they were getting contact with the reservoir was to break it open and to generate permeability through the tar sands, otherwise nothing would move in there.

And the experiments we did with the Lemming Pilot involved taking deviated wells and actually purposely going in there with a frack truck and sand and creating multiple prop fractures, much like what we're doing in the tight sands and tight oil today. As a matter of fact, I can't give you these, but I can show them to you. These are reports that I actually wrote back in '75 on that whole process, where we actually did the calculations for how many fractures could you put into a well before it broke the well, and how many could you put in economically to do this stuff.

Esso sat on that stuff for over 40 years and it never, ever saw anywhere past the light of day of the production research lab. But we actually did that with a couple of Lemming Pilot mills, and looked at trying to get more steam in the ground, and get it to go in and out faster.

PMB: I see from the cover that these are proprietary, owned by Esso.

SLEVINSKY: Yeah.

PMB: You wrote them, and one of them is dated April 1975; it's called a Theoretical Investigation of the Spacing of Multiple Vertical Fractures. The second one is dated January 1975, and it's called the Economic Evaluation of the Multiple Fracture Concept, a Preliminary Study. Thank you very much. That's on the record.

SLEVINSKY: And these were great fun. But like I say, it just kind of showed what was happening at the research lab; there were just no boundaries. If you had a problem, if you saw a solution, they were game to try it. It was a time in history where people were very open to the optimization, the attempts to try and do more with what was there at Cold Lake to make it economic.

PMB: But this was also the period when oil prices, because of the Embargo, were shooting up.

SLEVINSKY: All of a sudden oil went from $2 a barrel to $25 a barrel, and suddenly the Lemming Pilot was making money.

PMB: Now that happened over a period of about ten years.

SLEVINSKY: Actually, the Lemming Pilot started in 1974, and by 1976 it was generating a positive cash flow. It might not have paid for the investment to get there, but it was at least in a positive cash flow position. So it was one of those things people started to see the glimmer of where this might go.

PMB: And at one point Esso announced that it was going to expand the project and build a humungous upgrader, attach a humungous upgrader to it, and it was going to be something like a $3 billion project. As I recall, that died right after the National Energy Program.

SLEVINSKY: Yeah, the National Energy Program killed a lot of things because it took a lot of revenue out of the system.

PMB: It changed a lot.

SLEVINSKY: And probably cost Calgary 25,000 engineering jobs in the five years after it was announced. So it was devastating for the industry here. And, again, oil prices went down to 8 bucks a barrel, somewhere there in the middle, and it was hard for anybody to make a dollar doing anything.

PMB: It was quite funny; I remember the time we're talking about, and there were regular forecasts that there would be $100 oil by 2000 and, of course, come 2000 what was the price of oil, 20 bucks or something? I think the classic learning from that period is that anybody can forecast the price of oil. The one thing you can be sure about, though, is that you'll be wrong.

SLEVINSKY: Pretty much.

PMB: Okay. I was asking you to give me the bullet points about your career in terms of the oils sands.

SLEVINSKY: Well, basically those three years were my career with the oil sands. I was involved in just about everything that was happening. With Roger Butler, we were running experiments. In a matter of two years Roger, and I, and Chic Bombardieri filed 140 -- and he actually is the third name on the patent that Roger filed in 1978.

So this is the first patent that Roger filed after he got to the research lab. So this is the actual final one. I'm the last living signatory on this patent.

unfortunately Chic died in October last year. So he was 92; he was born in 1920. And at the time when we were working this stuff he was in his mid-50s and he was Esso's completions and well construction expert. So within the first six months or a year that Roger was in Calgary we proved that his vertical well concept wouldn't work. Economically it could not compete with what was happening with cyclic steam on the vertical and deviated wells at Lemming, and so Roger immediately regrouped, and we said well, how could you get higher rates? And we came up with horizontal wells.

They were just being introduced in Russia, and Skov Murray from Esso, was just bringing back the first Russian mud motors to run in Western Canada, and he was in Esso's Drilling Department, and he was the prime mover in bringing horizontal drilling technology to Western Canada.

PMB: And horizontal drilling technology became possible at the beginning because of these motors that the Russians had developed.

SLEVINSKY: That we imported from Russian. And they actually work better here because our mud systems were cleaner.

PMB: And of course that was still the Cold War, wasn't it?

SLEVINSKY: It was. But Esso had done some work in Russia and they had access to the drillers, and saw what they were doing, and then brought the technology back here.

PMB: And the technology; the idea of a mud motor is that you basically use the drilling mud that's going through the pipe.

SLEVINSKY: Use the prime mover at surface to pump the mud down, and it turns everything down hole. So electronics and everything down hole are turned from surface, you're just using the pressure and the energy you're putting into the mud to drive the rotary assembly down hole.

PMB: And so therefore you could almost direct the well in any direction?

SLEVINSKY: Well, we had to learn how to steer them, and that was not obvious, but they did very quickly come up with the tools and the techniques to do that. And so the first application of horizontal drilling in Western Canada was at Cold Lake.

Now, we drilled one 150-metre long horizontal well. It was completed in early '78 or '79, just after I left the research lab. I helped plan it, and then a young guy by the name of Ron McDonald, in the Drilling Department, was actually on the drilling of that first well. And so they had their struggles with that. They set the casing too high so they missed the zone by 90 feet or something like that, and then had to do remedial work on it. Finally got the well in the ground and started steaming it, and they had horrible results. Roger was crushed.

I was sitting and doing conventional reservoir engineering in the head office at that time, just watching what was happening, but the well only produced about nine barrels a day. It was just not draining the way Roger's equations had said. And then the field guys just got frustrated with it, and I said well, we'll do what we do with our other wells, we'll just crank it. And so they pressured it up and fractured it, fractured through all the little shales that were causing the drainage not to work, and all of a sudden they had a couple hundred barrels a day, and it ended up being one of the most prolific wells ever drilled at Cold Lake, as a drainage well.

And it kind of points to where Esso is today. Even though Esso had decided not to go with Roger's concept for doing the horizontal SAGD, now late in the game, they're going back to all the old wells and pilots, and they're drilling horizontal wells underneath, and draining the immobilized oil that was left behind by the cyclic steam to get higher recovery factors. And so now they're big proponents of drain holes. Roger would be so proud, but he never lived to see that.

PMB: And of course he died in 2005.

SLEVINSKY: Died in 2005; had a stroke on the beach in Hawaii. Was on a vacation with his wife and collapsed there. Just barely managed to phone to get contact with his son, and get to a hospital. They transferred him back to Calgary, and he died here. It was very sad.

Roger used to get all of us lab rats together back in the late '90s and early 2000s; once a year or so he'd get us all together, Don Townsend, Malcolm Cullen, and Dave --

PMB: What was the first name?

SLEVINSKY: Don Townsend. You have interviewed him already. Malcolm Cullen, who was our lab tech, and David Poon, another one of the researchers, myself, and Franz Greebe, and he was actually doing the experiments at Cold Lake with fire flooding. So he would just get all the old lab rats together and we'd go and have lunch with Roger once a year, over at Red Robin or someplace close to the university, find out how everybody was doing. And he was his same jolly old self.

PMB: Now, in the bio that you sent me you also mentioned that you were involved in some of the research related to Syncrude, and all of this stuff was going on in about the same time.

SLEVINSKY: All at the same time.

PMB: The construction of Syncrude.

SLEVINSKY: And I brought along some more pictures.

PMB: Now I'm going to ask you, may I keep these?

SLEVINSKY: You can keep all the photographs.

This is just a picture of the early construction, just construction and the framework, and the foundations for some of the Syncrude processing buildings. That was our tour bus. And we went out to look at the Syncrude test pit. The water in there is the bottom of the pit, and you can see the side walls, but you can also see some strange things happening in these photographs because there are these huge slumps. The walls of the pit were breaking away, and these are --

PMB: So the pit being the mine. The mining pit; the walls were falling apart.

SLEVINSKY: Yeah, they were. And the foundation underneath, we were trying to build the Syncrude facility actually in the bottom of the mine, in the test pit, and the foundations were breaking. There was a mysterious heave. They would put the foundations down, start to build on it, and stuff was heaving, and the foundations were cracking and breaking, and so Bechtold was going crazy. They were the site contractor.

This all came about because of a field tour that we did with Esso management. And so when I was out there looking at the test pit, and taking pictures, I recognized the failure mechanism, and it turns out that the failure mechanism in the pit base and in the walls is actually a plastic failure. And so I came back to the lab and said I know what causes that. And they said you can't. I said well, it's because the pit walls are failing, the mine base is actually becoming plastic. And they said well, why would it do that? And so we started doing some research into that, and it turns out that that water that you see in the bottom of the pit actually comes from the base of the tar sand, and from a carbonate unit at the base of the tar sand, and that water zone actually had gas in it, about six standard cubic feet per barrel. And as we took the pressure off by lifting off the overburden and taking the mine away, that gas and the water in the bottom expanded and it made the base sand and formation layers plastic. They were no longer solid.

And the solution I came up with, and this is where I learned reservoir simulation, was to drill tightly spaced rings of wells around the mine walls and to pump the water out to keep the base from heaving and from becoming plastic. And so this was my first -- it was kind of --

PMB: Your first visit up to Syncrude?

SLEVINSKY: First visit to Syncrude I recognized a problem. This is how amazing the lab was. If you had an idea they would let you pursue it, and I pursued this right through to the groundwater hydrology consultants like (indiscernible) and Graham who were from New York, and presented them the simulation of the solution, and how many wells they needed. Basically had to put vertical wells every 25 feet back from the pit wall in a ring around the pit wall, and pump all the water out at a very low rate, and all the gas out to stabilize the pit wall. And they do that to this day. They use them for coring and for measuring the quantity of bitumen that they're going to mine. But they also use them for pit wall stability.

PMB: Did you patent that idea? Is that one of your patent documents?

SLEVINSKY: No, this was just a solution that I did just off the cuff. So I learned how to run the reservoir simulator, I solved a problem and presented it, and it got accepted and implemented. It was such a wonderful environment to work in. It was, you know, just constantly learning, constantly seeing and solving problems. Like not only was there no resistance, but just every encouragement to go and solve problems and to be useful. It was just a fabulous environment to grow and learn in.

The research lab had a fabulous library, and I basically taught myself reservoir simulation or reservoir engineering to go along with the stuff I knew about fracture mechanics and plasticity to solve the problem. And three years later when they shipped me downtown to become a reservoir

engineer, they're going well, it seems kind of silly to send you on basic reservoir engineering school because you already know this; you're already using the simulator. So I kind of bypassed the system by working out at the lab.

PMB: I want to mention, I started to do this a while ago when you mentioned Bob Peterson. It's worth noting that Bob later became the President and then the Chairman, wasn't it, of Imperial Oil?

SLEVINSKY: Of Esso. Yeah.

PMB: And I think that was his reward for offering you the job.

SLEVINSKY: I don't know if it had anything to do with me. He was just the champion of Cold Lake.

PMB: I was teasing you. Tell me about Bob Peterson. He was a great man.

SLEVINSKY: Very, very direct, and just like my job interview, very straightforward. I had no idea that going to the research lab was going to mean that I had a job at the end of the day, but obviously he had that all set up. And he would just do things off the cuff like that.

Most of the time he was just there pushing. Cold Lake was always at the forefront with him. Just like with Roger, his idea of SAGD was always at the forefront. It was inevitable that there would be this collision because Bob was pushing to make the Lemming Pilot and the Cold Lake project economic. The cyclic steam offered them the highest rate of return, and the fastest initial rates, and even though the recovery factor wasn't as high, they got better economics by implementing it, and so Bob was all for doing that. He was looking forward to the day where he was going to have 3000 or 4000 wells running, and he was going to be producing a half a million barrels a day, and he could just see that happening.

Roger, on the other hand, was a believer in exponential growth, and he wanted them to do -- well, if you do one well this year, we'll do three next year, and nine, and then 27, and it's just going to explode. And Esso wasn't going there because he couldn't demonstrate the economics. He couldn't demonstrate that he could get the same rate of return that they were getting with cyclic steam.

PMB: And of course at that time you couldn't really demonstrate the economics.

SLEVINSKY: You couldn't demonstrate it. Well, there were a number of developments. The original patent that we filed was for single-well SAGDs; everything had to run out of one well. And short of fracturing that well it was hard to get the well started and to get the drainage to begin. The big breakthrough was actually caused by a guy by the name of Paul Jespersen, PJ Jesperson of Scepter Oil and Gas.

In the Tangleflags pool they implemented Roger's drain holes, but they put vertical wells in at the crest of the channel and injected steam at the top and drove it to the horizontal wells at the bottom.

I don't know whether Roger ever admitted this, but this idea of having a second well, or a second source of steam to provide the energy was what really kicked things off. So Jesperson's Tangleflags stuff in the early '80s kicked off a whole bunch of other patents. Roger's second one, where you have the two horizontal wells and parallel one above the other, and that was a result of the research that was done at the University of Calgary.

PMB: Remind me where the Tangleflags field is.

SLEVINSKY: It's just about on the Alberta/Saskatchewan border in southeastern Alberta, and it's a McLaren Channel, so a very thick homogeneous channel. And they tried a whole bunch of things in it, but this idea of putting vertical wells on the top, with steam injection, and then drainage out of horizontal wells at the bottom worked great, and they got tremendous rates out of them. Slightly better quality oil than Cold Lake or Athabasca, but it really kicked off the idea and it got Roger thinking about using two wells, or one horizontal well above the other.

In the mid '80s Roger was hired by the DEA 44 Consortium to write a computer program called Hot Well.

PMB: DEA 44 Consortium, who are they?

SLEVINSKY: That's the Drilling Engineering Association Consortium. The 44 was the project number, and it was run by a company called Maurer Engineering. And they basically tackled all of the key problems of applying horizontal wells, so drilling, drag, casing, buckling, all of those things. And as part of that they also did these predictive models, or hired people to do predictive models for conventional fractured wells and horizontal wells. And they were the impetus for a lot of the industry to get into using horizontal wells in a big way. They hired Roger to do the Thermal SAGD analytical model, and he wrote a computer program called Hot Well that the industry basically used before simulators become good enough, to actually do their planning and their initial scoping of SAGD production.

PMB: What were the computers like at that time? I would think fairly primitive. I remember I got my first personal computer around '81, and prior to that I was using, I forget what they call it, a Wang Word Processing System, which a number of us shared.

SLEVINSKY: Well, at the time when I was at Esso's research lab personal computers hadn't been invented yet, and so we were all using mainframe applications; and we had access to something called TSO, the Time Sharing Operating System, on the IBM 360 in the head office. So we were all terminalled in, and we progressed beyond my university stuff so we didn't need to have punched cards, everything could be typed into monitors, so we were really high tech.

But in reality, the best computers of the day could be blown hollow by any laptop today. I remember in my first training course that Esso finally decided to offer me in reservoir engineering and enhanced or advanced reservoir engineering school, and it was all about simulation; we were there for a two-week school in Houston. And on the weekend they shut everything down, nobody could

do any homework problems because they were going to start up the Prudhoe Bay Reservoir Simulator, and it was the first time that they had done that, so they were using all the resources of the tech centre in Houston, which had the biggest computers you could buy, a big IBM 370. And it took all weekend just to initialize the model, and the model had 30,000 grid cells. And we were all going wow, a thousand grid cells was a big model, but 30,000 was just impossibly huge, and you needed something that big for Prudhoe Bay.

But they couldn't even run anything, all they could do was initialize it. They could actually calculate the initial properties of every grid cell in a weekend. Well, I could run that in a laptop on my desk, in a half an hour today, that's how much things have changed.

But it was a wonderful time to be there. I got to learn reservoir simulation from the guy who wrote the book, Don Peaceman; who essentially invented numerical reservoir simulation at Esso's Research Lab, and he was there teaching the course. So you've just got to learn from the people who were on the forefront of doing that.

PMB: I recall that in the first large super computer, I think it might have been an ERCB computer, came into Calgary in 1963 is the year that sticks in my head, and it was so huge. But it was on the ground floor and, of course, there were glass windows, and everybody was so amazed that at lunch hour people would just line up outside the ERCB and look at this computer with the big tapes.

SLEVINSKY: Big disk packs.

PMB: But everybody was so astounded at that. And, of course, it couldn't do anything. Probably my iPhone can do more than that thing could.

SLEVINSKY: You've probably got more horsepower in there.

PMB: Okay. Now, where are we with this?

SLEVINSKY: I had basically gotten downtown and left Esso, and I went and joined a consulting company.

PMB: And the consulting firm was called?

SLEVINSKY: D&S Petroleum Consultants, or Petroleum Consulting Group, and I became the manager of their Reservoir Simulation Group.

PMB: D&S; that probably stands for two names.

SLEVINSKY: DenHartog and Sumner were the two guys who started it, but at the time Bob Sumner had left the company and it was just Ted DenHartog and Bill Fisher who were the two principles there. And it was Calgary's largest technical consultant at the time. So we had six reservoir engineers working doing simulation studies, and probably another dozen or so doing economic

evaluations, and then techs, and we had people doing petro physics and geology. I think in total there were eleven different groups, and they sold timesharing services, and did anything to make a buck.

But for ten years I roamed the world doing reservoir simulation studies, and keeping track of the other engineers that worked for me, and got thoroughly burnt out. I worked everything. I did the first reservoir model studies for the Canadian government on the Hibernia oilfield, I did stuff up in the Canadian Arctic for Panarctic on Drake Point and ADGO, and all the oil discoveries in the basin.

ADGO, it's about a billion-barrel oilfield just off the mouth of the Mackenzie Delta.

PMB: Right, I remember that now. And of course it hasn't been developed.

SLEVINSKY: None of that's been developed. It brings back funny stories because Petro-Canada was the ultimate inheritor of all that Panarctic oil and gas property set. And I think it was probably eight years ago now they decided they wanted to take a try and bringing Drake Point LNG back on stream, so they're trying to redo the studies and see if they can do tanker to LNG to bring into the American East Coast market. And, again, it's one of these things where people ask you do you know anything about this? And I said well, I wrote the last simulation on this and you'll find my name in the report. But I can tell you right now that you don't have enough gas to support tanker to LNG.

They wasted two years, came to the same conclusion; it wasn't big enough. But it's just one of those things just tucked in my files and in my memory. I've worked on so many pools around the world it's just unbelievable. But it gave me, in the process of being burnt out, a wide range of experiences on every kind of reservoir.

And then in 1990 I ended up at Petro-Can as Principal Reservoir Engineer there, and stayed there for almost 20 years, until Suncor took over.

PMB: I want to talk to you about that because in your notes you said that you used reservoir characters Asian and modelling, and developed the first geostatistical model for the Mackay River SAGD Project. Could you talk a little bit about that, please? Again remembering that I'm really focused here on the oil sands, so Mackay River is quite important.

SLEVINSKY: And like I say, coming back to Petro-Can got me back into what they were doing with oil sands. And again, 1990 was particularly bad; 1990 through 1995 Petro-Can basically shut down all its research lab, and all the heavy oil research they were doing, and then the Dover Pilot, in the late '90s worked, and everybody got enthused about it, even more so because Petro-Can owned the lease directly offsetting Dover where the pilot was. And so Mackay River sits right next to where the demonstration project was that ran horizontal wells.

PMB: The Dover Project was by whom?

SLEVINSKY: Well, it was run by a number of companies over time; initially AOSTRA and then Devon took it over.

PMB: So this was the UTF.

SLEVINSKY: That's the UTF Pilot. And it was right next door to Mackay River, and so that kicked off the desire to duplicate that. That looked like we had our pilot, we could go commercial. And so they drilled hundreds of core holes, and got all kinds of geological data from mapping. And at about that time in the mid '90s geostatistical --

PMB: You mean the Dover Project drilled hundreds of wells?

SLEVINSKY: No, the Mackay. We actually drilled --

PMB: You, at Petro-Canada.

SLEVINSKY: So we drilled 180 or so core holes on Mackay River to try and map it out, and figure out in advance where we would put our project and wells, and try to do the simulation to predict what it would be. So rather than going out and just doing it experimentally, we let Dover be our pilot, at zero cost to us, or minimal cost to us.

PMB: Well, you were putting $1 million or $2 million in to be part of the consortium.

SLEVINSKY: And at the same time we were planning a $250 million investment next door because they'd actually done all the hard work. And so during the 1990s I'd been working with a geologist called John Knight, at Petro-Canada, and he was their principal geologist, and between the two of us we ran training courses, marrying reservoir engineering and geology. We brought in geostatistical analysis packages, we began analyzing the East Coast offshore reservoirs, the Canadian reservoirs, we wrote, I don't know, five or six papers together.

One of the jobs we undertook was the building of this Heresin Model for Mackay River. So it was the first time that anyone had actually built a geostatistically based on model for the geology.

PMB: Heresin Model; where did they get the name?

SLEVINSKY: It's built by a French company called Beicip-Fran Lab, and they were basically offshoots of a French research institute called IFP, Institut Francais du Patrols.

PMB: I talked to Don about that a little bit.

SLEVINSKY: So Petro-Can had invested in IFP. In order to get us to use their services we actually bought part of IFP, and as a result we owned part of Beicip and Fran lab, and all these subsidiary companies, and we got about $6 million worth of research out of the French, and we could then try

and direct that to our own best uses. And we were interested in things like flexible seafloor connections, all that kind of stuff. And they were doing a lot of work on reservoir characterization.

So John and I would go to Paris a couple of times a year to have meetings with them, and discuss how we would do characterization for our East Coast offshore reservoirs, and for Mackay River, and use their software, and build models of our reservoirs. And we had some incredible successes and some incredible failures, but largely it was a successful thing.

We were able to generate better quality reservoir simulation prediction models. The models that we built for Mackay River lasted for, I don't know, four or five years, and they proved their worth many times over because our ability to predict what was going to happen was much better, and we were able to come up with pretty close to our design specs.

PMB: And so what percentage did Petro-Canada own of the Mackay River project?

SLEVINSKY: One hundred percent.

So we owned that land, and we were able to go into it with the highest level of technology that was available at the time. And it's continued to this day.

PMB: And today it produces….

SLEVINSKY: Mackay River, depending on where they're at with their phasing, between 30 and 60,000 barrels a day, and has 250 million barrels reserve.

PMB: And of course now it belongs to Suncor.

SLEVINSKY: Now it belongs to Suncor. It's part of their portfolio. And the team that was working Mackay River is largely what Suncor is using to manage their Firebag Project.

PMB: Now when Suncor acquired Petro-Canada were you still at Petro-Canada?

SLEVINSKY: I was. I was principal reservoir engineer, and Suncor did not really appreciate what it was that a principal reservoir engineer did, or the principal geologist, or the principal production engineer, and it was Grant Duncan that you talked to before. But we basically worked worldwide solving problems in our respective disciplines, and so we were in Syria, and Libya, and the North Sea, and Denver, and Western Canada, and the oil sands. So we worked everywhere. We weren't tied to an asset, and Suncor's model just couldn't come to grips with that; they thought we should be senior reservoir engineers working on a project somewhere. And I'm sorry, but I haven't been a senior reservoir engineer for 30 years, and I wasn't going to stay there under those conditions.

PMB: Okay. And so you quit and went to?

SLEVINSKY: I actually retired. So they would have liked me to quit because I would have lost all kinds of benefits, but I stayed long enough to qualify to retire.

PMB: You had the age plus years of service.

SLEVINSKY: Had the age plus years of service, and a not insignificant pension, and somebody willing to pay me more to have more fun.

PMB: I am going to ask you about your current situation. But first I'd like you to tell me as much as you can about the Joslyn blowout.

SLEVINSKY: I think that's just major engineering failure. Total was operating a very, very shallow reservoir at far too high a pressure. In order to get high steam temperatures you have to operate at higher pressures, and they, in my opinion, operated it at an unsafe level of pressure, high enough to actually lift the overburden to the point where the cap rock broke and they lost containment. So steam moved up the hole.

PMB: What year did that happen? I know that it was within, I'm pretty sure, the last 10 years.

SLEVINSKY: 2007 or so. And once they lost containment they blew out a hole about the size of a football field - I've got a photograph of it somewhere, but I don't know quite where - and I know that we participated with Total in some post-incident analysis. My analysis, based on the fracturing behaviour, was that they had caused the accident.

PMB: Now at this time did Total own a hundred percent of the Joslyn play?

SLEVINSKY: No, Enerplus actually owned a significant chunk of it, and sold out just before everything went boom, and sold out at a high enough value that we were able to ensure our future. So the money, the proceeds that we got from selling off our oil sands; we had Kirby (indiscernible) which was our own developed project, as well as Joslyn, and we sold that to CNRL in 2010, and we sold out of all our other equity investments in the oil sands over the last two years, and we've reinvested that in tight oil and tight gas in the U.S. So we bought into a company that was developing the Marcellus shale in Pennsylvania, which is the most lucrative shale gas development in the U.S. And we also bought into a large position in the Bakken, in North Dakota, and are drilling that out.

PMB: Now, you've really got me quite interested. So you left Petro-Canada. You joined Enerplus in what year?

SLEVINSKY: 2010. January 4th, 2010.

PMB: And now Enerplus has in the last five or six years got rid of all of its oil sands.

SLEVINSKY: Divested all assets.

PMB: What assets did it have?

SLEVINSKY: Joslyn, the Kirby developments, and some carbonate stuff that's, oh crumb, I'm trying to remember the project name. It just escapes me, but it's in the Grosmont carbonates, so it's actually heavy oil right from where we think the carbonate or the oil sands started from.

PMB: So you got rid of that, and then you got into the tight oil and shale gas. Isn't that an interesting thing….

SLEVINSKY: Well, it's largely, in terms of the positioning of a company like Enerplus, because we pay out a large dividend on our shares. So if you're paying out 6 or 7 percent of share value every year in dividends, and then try to grow the company, you need to have a very high rate of return on the projects you invest in. Oil sands can't do that. About the best an oil sands project can do is 6 to 10 percent rate of return, and they're good for the long term, they're stable, they're long-term producers, but in terms of rate of return they just don't cut the mustard. You just can't run a company like Enerplus on oil sands.

And other companies that are involved in these things are finding that you have to be very big to handle the high cost of operation. So companies like Penn West, Penngrove, which have oil sands investments are having a tough time making a go of it these days.

PMB: Now I want to go back to the beginning, understanding that you're an engineer and not a geologist, your understanding of how the oil sands originated.

SLEVINSKY: Well I mean I get everything by hearsay.

PMB: Okay hearsay then.

SLEVINSKY: Basically the oil was supposedly originally sourced in the carbon, so the Grosmont formation, and at some point erosion ate away at the top of the cap rock, and oil leaked out of the Grosmont and then became the world's largest oil spill. So if environmentalists or people are wondering whether the Earth can withstand an oil spill, well, try spilling 3 trillion or 9 trillion barrels of oil on the beaches of Northern Alberta, and the Earth is still here, and the oil is still there. And we're cleaning it up.

PMB: And that's kind of funny, but people who are worried about global warming, and climate change….

SLEVINSKY: They don't share my opinion about it.

PMB: They don't find a lot to laugh about in that. And you will remember that around five or six years ago there was a UN-funded project that basically did, indeed, conclude that carbon emissions are changing the environment, and the science is arguable, but it does support that idea.

SLEVINSKY: Well, in my view, and that's maybe because I'm just an old reservoir engineer who's been producing oil and gas for 40 years, is that everything changes all the time. There's no such thing as a stable climate environment. The Earth has had times when it's been totally encased in ice, it's had times when it was tropical at the Poles, and we've had alligators swimming over palm trees in Baffin Island in the night. So it hasn't always been the way it is today, and it won't always be this way, forever.

And at one time I was playing with a computer program called Time Machine Earth, which plays with plate tectonics, and I was playing backwards and forwards in time, watching the continents move, and I decided to play forward in time, and at some point in time the screen just went blank, and a message came up and said "The Sun has entered its terminal red phase and has expanded, and the Earth has just been incinerated." So for the environmentalists out there, that is our ultimate fate. We will eventually be baked to death, and killed by the Sun when it expands and drives off our atmosphere, and we become a dessert cinder in space.

PMB: What is the name of that game?

SLEVINSKY: Time Machine Earth. It's actually a geological program for geologists to plot the motion of the continents from the beginning of time.

PMB: Can you download it for your personal computer?

SLEVINSKY: I don't know whether it still exists or not. My version came on diskettes, like five and a quarter-inch diskettes.

PMB: Oh, good Lord, we're talking ancient technology.

SLEVINSKY: Yes,we're talking ancient technology. But it was a shock to me, and I'm going oh, okay. So we are sitting on a doomed cinder, and it doesn't really matter. It's only if you're thinking short term, not in hundreds of thousands of years, or millions of years in terms of the existence. Whether we'll even exist as a species is questionable altogether by the time the Earth becomes a cinder. All we can do is the best we can with what we've got for when we're here.

PMB: Now, a couple of last questions. You've done a great job. And then I'm going to hand the microphone over to you directly. You can say what you want.

In terms of government policy, Alberta has the ERCB, which it's my understanding has been for many years a globally renowned reputation as a good regulator. Your impression of that?

SLEVINSKY: I think the Alberta Energy Regulator, or the ERCB, whatever they're called these days, has done a magnificent service for the people of Alberta, for the industry. I'm constantly taking teams of people over to the ERCB core lab where thousands and thousands of wells are stored and the cores are stored, under law, so that anybody can go look at them, and see what's underground, and mount them, and study them. That doesn't exist anywhere else in the world. I've

been in places where wells have been cored, and the stuff's just been thrown in the dessert. If you don't know where it is, or what shed it's in, or what dune piled over it, you'll never, ever see that rock again, or be able to study it.

They've provided access to all of the data. They've provided good regulations that have kept the people of Alberta wealthy and safe, and I don't have enough to say good about them. They've been a wonderful asset for Alberta. It's been a wonderful program.

PMB: And one of the great ironies, of course, is that when your company sends drill samples to the Board, you're basically providing information that your competitors can use you have used the information from your competitors.

SLEVINSKY: I have used other people's. And that's all fair game. It's provided more value for the people of Alberta because more oil and gas has been found because people have had access to all of the information. And it's wonderful to live in that environment. I've also worked all around the world, and know how hard it is sometimes to get access to information. I just marvel at just how easy it is here, and how hard it is elsewhere.

PMB: When I get home I'm going send you a pdf of the new history of the Energy Regulator. It was just released a couple months ago.

SLEVINSKY: I was thinking that you might also want to talk to a guy by the name of Mike Danyluk. He used to be head of Petro-Can's research lab on the oil sands side, and he's now kind of in semi-retirement, but he's working as head of the Information Technology Group for the ERCB.

PMB: And you don't by any chance have his phone number?

SLEVINSKY: I could probably get his phone number or his email for you.

PMB: In that case I'll send you the pdf on condition you send me his phone number.

SLEVINSKY: Yeah.

PMB: Anyone else that you would recommend?

SLEVINSKY: Well, there's a couple of people; one of them is a guy by the name of Jeff Stevens. So he's another one of my old lab cohorts, and he's just on the corner of that photograph. He was involved in research at the research and technology lab, studying building Arctic Islands and building islands for Norman Wells, but eventually when the PRTS lab got shut down Jeff was transferred to Syncrude, and he spent 30 years commuting between Calgary and Edmonton doing research out of Syncrude's research lab in Edmonton.

PMB: Does he now live in Edmonton?

SLEVINSKY: No, he lives in Calgary.

PMB: Oh, that is really interesting. I'd love to do that.

SLEVINSKY: His wife was a high school teacher here at Western Canada High School, so his wife and kids stayed here and he commuted back and forth for close to 30 years, working out of Edmonton. But he would have wonderful stories to tell about Syncrude, I'm sure.

PMB: That's extremely interesting. Syncrude, 30 years. Okay. And that's pretty much it. I would like those photographs.

SLEVINSKY: These are just photographs. These are the beginning of the Lemming Pilot, and some of the facilities before they ever had oil go through them and make them dirty, as well as some of the older stuff. I dug these out of some slides I have, the other day, just to prompt my memory.

PMB: Well, let me ask you a favour, if you wouldn't mind. I'd like to donate those to the Glenbow.

SLEVINSKY: You can have them all, donate them all.

PMB: Would you write on the back of them what each one is.

SLEVINSKY: Sure.

PMB: And maybe mail them to me, or when I'm in downtown I can come by and pick them up.

SLEVINSKY: Sure, I can do that; put them in an envelope for you.

PMB: Okay, based on the long discussion we've had over the almost an hour and a half, what else would you say? Now you've got the floor. What have we not talked about about the oil sands that you think needs to be on the record?

SLEVINSKY: I don't know, just how long, and how hard, and how much research had to go in to make it work. When I started working on Cold Lake they had been struggling away at that for 20 years, at a loss. But the companies at the time, the industry at the time, seemed to have an appetite for doing the researching, and doing the hard work, for creating an environment where creative people could take a crack at these problems and try to solve them. Nowadays I just don't see that. Everybody's kind of withdrawn. Nobody invests in research. They allow universities to do it, or someone else will do it, will just pick it up on the down low. All the small companies won't do any fundamental research. It's just a shame because it was such a wonderful environment, such a wonderful growth environment for people to learn the technology and to be useful.

PMB: What is it about Imperial Oil that -- really, it was formed around 1880 or 1885 or something like that, and became part of the Standard Oil Trust, but what is it about Imperial that for really 130

years or something, it really has been a leading edge company in research, in new developments like this -- I forget the name of the new one they're using.

SLEVINSKY: Kearl, right now.

PMB: They're doing the Kearl Project which uses a brand new technology, will use a brand new technology.

SLEVINSKY: I don't know what it is that drove it to be that way. I know that I found it to be immensely open. It may be that it has that heritage of allowing people to innovate, and not being there to stand in the way, and really has been competitive ideas, like Roger Butler versus Bob Peterson, and the whole SAGD versus cyclic steam. Both ideas got their maximum shot at it, and it eventually came down to an economic one; what created the highest rate of return? Where can we make the most money?

The decision on an upgrader; eventually the upgrader became the Edmonton Refinery and more than 50 percent of their feedstock is heavy oil from Cold Lake forever now. So they've been willing to step out there and do it, and it was an amazing organization to work with. I can't think of a better way to have started a career.

PMB: Okay. And then finally the last word's yours, and then I'm going to turn this off.

SLEVINSKY: Oh, just thank you. It's been interesting. I've carried this silly patent around with me since it was issued in '76.

PMB: Is there a chance that I can get copies of --

SLEVINSKY: That's the copy for you.

PMB: I can have these?

SLEVINSKY: I've got the original in the old faded orange, or whatever. You can have that one. It's got some of the preliminary letters back and forth, asking people to make changes and whatever, but I kept them as a historical thing just because I knew that eventually this was going to become something. And I think I may have the only (indiscernible) original copy direct from the Research --

PMB: Oh right, well I'll tell you what, I'll trade with you. Thank you very much. This has been a really interesting, for me, very exciting project.

SLEVINSKY: Well, thank you, it's been very interesting. I know that when I first came over here, and the first project we had was to sell off the Kirby Project. The vice president who was in charge of the oil sands here, the first question to me when I appeared was "Do you know anything about this?" and I just laughed. And when I told him I invented it, he laughed at me, just like what kind of

-- yeah, right. And then I brought him the patent to show him, to prove that I had actually been one of the people that invented the process.

PMB: That is really cool. Thanks again. Thank you very much.

SLEVINSKY: Oh thank you very much. It's been very interesting.

[END OF RECORDING]