

BARRY STEWART

Date and place of birth (if available): Winnipeg, Manitoba

Date and place of interview:

Name of interviewer: Peter McKenzie-Brown

Name of videographer: Peter Tombrowski

Full names (spelled out) of all others present:

Consent form signed: Yes

Transcript reviewed by subject:

Interview Duration: 1 hour, 22 minutes

Initials of Interviewer: PMB

Last name of subject: STEWART

PMB: The date is the 10th of July, 2013. I am talking to Barry Stewart who is the director of Newalta Resources, which is an oil sands company and we will talk about in due course. Barry, I would like you just to begin please by just telling me about your early years, just your life story including your education, where you were born and so on.

STEWART: Okay. Well, Barry Stewart's the name, born in Winnipeg. My parents moved around a bit so I ended up finishing High School in Ontario and going to Queen's University where I took an engineering physics degree. I graduated in engineering physics from Queen's in 1964. My parents had actually moved to Calgary while I was at university, I came out for a couple of summers and managed to get a summer job with Imperial Oil. So, I spent the summers after my second and third year working for Imperial Oil out here in Alberta.

PMB: Roughly what years were they?

STEWART: That'd be 1962, 1963. So, upon graduation in 1964, Imperial Oil offered me a job. So, I came west and then joined Imperial Oil as an engineer and spent the next 20 years with Imperial Oil in various functions. I always laugh because in the first 10 years I actually lived in nine different cities. I had three young children. So, our early life was moving around from Regina to Calgary to Edmonton to New York City, Houston, Dawson Creek, you name it. So, it was a treadmill, but it



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



2

was a lot of fun and gained a lot of experience. In the latter part of my career with Imperial, I'd say I was there about 20 years, in the latter 1970's I was at one point the General Manager of engineering and then became the General Manager of Operations. My last stint with Imperial actually was with Exxon was running their exploration and production group in Columbia, South America. So, the 20 years with Imperial Oil were obviously the formative years of my career. I didn't have much direct involvement with heavy oil in those 20 years, but I had a lot of secondary involvement. People like Bob Peterson, he was a good friend and he went over to lead that project; **Gordan Willman**, the same way. Guys like the researchers; **Don Townsend** and I were good friends and he did some of the early research on the Cold Lake prospects.

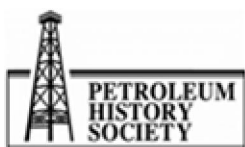
PMB: I am hoping to interview **Don Townsend** in the next couple of weeks, oddly enough.

STEWART: He was a researcher as well. I guess the most interesting thing from the history, because I'll build on it as we talk about the next 20 years, was when I was General Manager of Engineering. This would be 1977, '78, '79. One of the groups that reported to me was the little research group in south Calgary and Dr. Roger Butler was running that group. Many people are well aware that Roger went on to become the father of in-situ heavy oil. But, in the late 70's he was just formulating these concepts. Roger was a doctor, Ph.D. in engineering, chemical engineering I believe. He had been a professor at Queen's University and then he had hired on with Imperial Oil to run the little research group in south Calgary. Anyway, he came up with this concept of what he called the, in-situ, the SAGD, steam-assisted gravity drainage concept. The idea that you could somehow drill horizontal wells into the oil sand deposits; inject steam into one, heat the reservoir up and gravity would have the oil flow down. The heat having thinned out the oil, it would have flow down to the rocks to the second well.

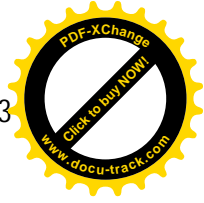
Well, I of course told him he was just full of it and that that was a ridiculous idea. The reason for that, and that's why Roger was so far ahead of his time, was that the technology of horizontal drilling was not nearly the way it is today. The concept of having enough vertical continuity and reservoirs where this would work was not normal in most of the reservoirs we worked in. I mean, if you go back to how rocks are laid down, most of them are laid down in horizontal strata. Of course, they are inter-bedded between limestone or sandstone, but there's always a lot of shale and other things in there which are relatively impermeable. So, most people recognized that when you're producing oil reservoirs you're trying to get oil to flow horizontally through these rocks to your wellbores. The idea that you could possible get the oil to flow vertically over any distance with all these intervening layers of shale and what have you was not considered to be realistic. So, Roger said, "Damn it, we will find places where there is enough continuity and this will work." He worked away at it.

PMB: He actually drilled the first test on that, if I am not mistaken, at the Esso Cold Lake Project. Was it in 1979?

STEWART: He might have. I forget the exact project but he left not long after that he joined AOSTRA and get involved with what is called the Underground Test Facility where they worked on



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



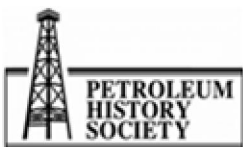
it in Athabasca. You have to remember the big deposit that was being worked on in those days was Cold Lake. That was Imperial Oil's big thing. Cold Lake had the beauty of having a lot of oil. It was a very thick reservoir, very rich in oil, but it was very layered. It had many, many relatively thin layers spread over a big section. So, it had a lot of oil. So, that's where the, what they called huff and puff; you inject steam in for a while and you flow oil back, because you were really trying to get some heat out into the horizontal layers of the rock and then produce it back. That's what Imperial still does in Cold Lake, because of the inter-bedded rocks. There's no way that there was enough vertical continuity in most of the Cold Lake area for SAGD to work. So, that's why people were skeptical that it would work, because the rocks didn't seem right and of course the technology of drilling wasn't there.

Having said that, Roger was determined to pursue this and Roger (I forget exactly what year), but he did leave Imperial Oil and joined the Alberta Oil Sands Technology Research group and got involved with a thing called the Underground Test Facility. That was a project now in the Athabasca sands not in the Cold Lake sands, because one of the beauties of the Athabasca sands is they are very thick and tend to be relatively continuous. The disadvantage of the Athabasca sands is the oil is so much heavier than in Cold Lake. If you look at the Cold Lake rock deposit, it's kind of a tary mess. It looks like oil, it is maybe gooey and thick, but at least it looks like oil. When you go to Athabasca it looks like grey sand. I mean it's really gritty sand. You're not even sure that there's oil there. So, the idea that somehow you could get Athabasca oil to flow through rock was again, a lot of people say, "That will just never happen." That's why mining was taking place.

Anyway, Roger got involved. He got involved with this Underground Test Facility and because horizontal drilling wasn't well enough established in those days, they actually sunk a mine shaft and they had a big cavern underground in the reservoir. And, then they drilled with basically with rig standing on the side, drilled horizontal wells into the reservoir and produced oil out of them into a cavern, an underground cavern, at the bottom of a mine shaft. Again, Roger was leading the way.

PMB: I'd like to talk about that. The Underground Test Facility of course, you had a grand facility and you just drilled straight into the reservoir and thus you were able to do that. To do that from the top, I believe the first test was run in 1987, to do the same thing from the surface as not technologically possible at that time. Is that true and if it is true, what changed? What kinds of the technologies came along that made it possible to do SAGD?

STEWART: The concept of drilling from the surface down and then horizontally out was a concept that had been around for a long time, but the ability to do that wasn't good in the 70s, even into the 80es. By the time you're getting into the 80s and certainly into the 90s, the technology was improving. It was a combination of about two or three things. One was just the physical ability to get enough pressure and what have you and I don't know the drilling rig details, but be able to drill a well horizontally. But, more importantly was to be able to control where you were. If you think about it, you've got this reservoir that's yay thick and you're trying to lay two parallel wells in there, you're going inject steam into one to heat the reservoir above it and the other one, you're going to have oil flow down and produce back. So, you need not to drill a horizontal well, you need two wells



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



that are essentially deadly parallel, close together along the bottom of the reservoir. So, it was the concept to be able to control where you were drilling horizontally, precisely. Drilling out half a kilometre or a kilometre and now they drill further. The whole ability to be able to control where you were and measure where you were didn't happen until the 90s. That was the difference when suddenly you could put the wells where you needed to put them, relative to each other and relative to the reservoir to make SAGD work. If the two wells aren't parallel beside each other, you're not going to be effective and if they're not at the bottom of the reservoir, you're heating the reservoir up, oil is going to flow down and you're not going to recover anything under the wells. So, that result was that you had to be able to control where those horizontal wells were going and if you talk to some of the historic drillers I am sure they can give you much more detail. But, the ability to control exactly where you were putting horizontal wells over say a kilometre out was the big break through that made SAGD at least feasible from an engineering point of view.

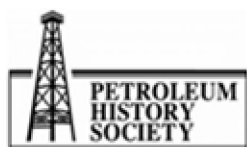
PMB: So, it was underground drilling, drilling tools that made that possible?

STEWART: Exactly and then measurement devices. So, they didn't have that, so that's why Roger came up with -- they drilled this mine shaft down just to prove the reservoir concept would work. He just had faith. It was never intended that the underground mine be a commercial project. It was just to prove in place that this would work. People were very skeptical. It's one thing to put steam into Cold Lake where you have this gooey tary stuff. It is another thing to put steam into the Athabasca where you had this gritty sand is all you really have and think that you're going to create mobile oil. Roger was way ahead of his time in saying, "We can do it in Athabasca."

PMB: Can you tell me a little bit about him, because he is quite a legendary character? He died in 2005.

STEWART: Well, Roger was a Brit, I guess. He had his doctorate as I say. I am not sure where, but I think from a British university. He had moved to Canada and he was a professor at Queen's University for a period of time and I am going to say a decade. You know Roger looked the part. If you were in Hollywood and you were to cast somebody as an absent-minded professor, you'd cast him. He was always a little chunky, a little disheveled, a little ruffled, a little wandering off in his thoughts and yet very focused on his science. He was just the character you'd expect if you said you've got a scientist ahead of his time and some technology coming out of a British university. He was the guy. You'd cast him in Hollywood in a minute. He was just that kind of a guy.

PMB: Fair enough. Now, I would like to go back a little bit. I notice in your resume that you've actually written a couple of historical novels. One of them, I believe is on Sir Francis Drake and the other one was on Captain George Vancouver; so, both British historical figures in Britain. You've written a book on Canada; Canadian travel history and so on. So, you've written and published all these within the last ten years. So, history is part of your make-up. Can you explain that? Can you talk a little about those projects and can you tell me what it means to have history as part of your DNA?



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



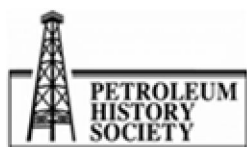
STEWART: I don't know how it got into the DNA, but I've always been fascinated by history. A bit of an aside, I mentioned I graduated in engineering physics from Queen's. So, you're an engineer and a physicist, so the last guy you think would be writing novels. To be honest, when I graduated from Queen's I did not just have the medal in engineering physics, but actually got the award for the best performance in the non-engineering subjects. So, I guess I had always had an interest in the non-scientific part of what was going on. When you take engineering you still have to take English and history and what have you. So, I've always had an interest in that. It probably started because I was influenced by a High School teacher who was very good. So, it just got into me. I mentioned moving around in my early career. The net result of that was that I lived in five of the ten provinces, but I actually did business over my career in all ten provinces and in the territories. So, I had experienced all of Canada in my career.

I also had a number of international experiences. I lived in South America for a couple years, but even in the latter part of my career, I was doing a lot of international travelling: Australia, the Middle-East, northern Europe. So, I was able in a way to sort of contrast Canada to a lot of other things in the world and it just fascinated me.

So, when I retired in 2001, I thought, "You know, I am going to write about Canada," and so I did. Over the next couple of years, I wrote this book called, "Across the Land: A Canadian Journey of Discovery". And, it's really trying to tell the story of Canada anecdotally in a way. So, I got that interest. I got interested in the history of Western Canada, because that's where I've basically lived most of my life I started to collect books from the early explorers. These are books published in the 1500's, 1600's, 1700s and what have you. So, I got very intrigued by the early explorers and the stories that they told when they came back. So, these couple of novels that I wrote, I built on that. They are, I won't say action, I am overstating them a little bit, but they're kind of a dynamic story. In the modern world and according to book collecting, but flashing back in the one instance to the 1500s to the Elizabethan times of Sir Francis Drake and the other case of the late 1700s the times of James Cooke and George Vancouver and all of the people who were doing the real exploration of the Pacific; therefore, the Pacific Coast of Canada. So, my books involve flashing back to those historic times, but putting it in the context of today's collection history books and what have you. So, I just have got that kind of an interest.

PMB: Great. Now, you've kind of jumped ahead and jumped back quite a bit and you've given us some great information. Could you go through your career at Imperial and Petro-Canada and so on; go through your career and specifically talk about the areas where it sort of impinged on heavy oil, the very heavy oil but also the oil sands?

STEWART: Yes, for sure. Well, as I mentioned my first 20 years were with Imperial Oil. My involvement with heavy oil was peripheral. Probably the most direct involvement was when I had Roger reporting to me and the research group because he was doing work like that. I was interacting with people like Bob Petersen and what have you, but I wasn't directly involved in heavy oil in my Imperial Oil career. Then in the early 80s I joined Petro-Canada and my first job there was as senior vice president of production, they called it. One of the involvements there was to represent Petro-



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



Canada on the Syncrude technical management committee. So, I then got involved with Syncrude, if you will, in a technical operation way and now we're talking in the 80s.

PMB: Okay, so Syncrude had been on production since '78, if I am not mistaken?

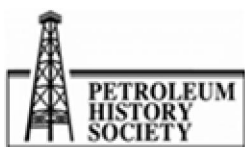
STEWART: Right. It was still relatively new. It was five years old and...

PMB: A lot of technologies still had to be sorted out?

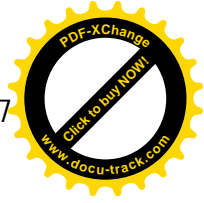
STEWART: Well, in those days of course the great Canadian Oil Sands, the Suncor Project had been operating since the ten years earlier and now the Syncrude project had been operating for five or six years when I got involved. It was tough going. I mean oil prices were nowhere near where they are today and yet people were making these big capital commitments. The whole concept of mining of course, because the deposits you would get at were near the surface. So, it was a mining operation. You would take the oil sands which were sand and oil, do the hot water process to separate it and then semi-refine the bitumen that you ended up with into a marketable product, which they called synthetic oil. Very expensive operations, both the Syncrude and the GCOS operations and big equipment involved, big bucket mules, drag lines and conveyor belts. So, it was big equipment which was needed to have scale, but it was also not just costly but anytime you had an operation problem turn around and operation problem, a big part of your operation went down. It was in big lumps. So, if your conveyor belt went down you weren't producing today. It was very unreliable in a way, certainly erratic in its production and high cost. So, people were struggling to make it economic.

Having said that, as we got into the 80s, oil prices did go up; they had the Middle-East wars and embargos and things that had taken over. So, oil prices, by the time we got into the mid-80s were now getting up to \$20.00. Well, \$20.00 doesn't sound like much today. But, I guarantee when oil was \$8.00 or \$10.00 for most of your career, \$20.00 was pretty exciting. So, people started to say, "Hey, we can do more. If we can do this back when it was ten, we can sure get at it when it was 20." So, people started to think about doing more and new projects were talked about. Probably the biggest, highest profile project that I got a little bit involved with was a thing called OSLO. OSLO stands for the Other Six Lease Operations. That was the leftovers. So, a bunch of companies came together to create Syncrude. There were six or eight companies that formed as consortia. They pooled a number of their leases which became the Syncrude leases. Well, there were other leases that people hadn't brought into the Syncrude consortia and now they were getting together. This involved Imperial Oil, Petro-Canada, Shell and a number of people.

They were looking at a new project and there was a lot of excitement about that in the mid-80s. Suddenly, oil prices were up and things were operating. They may not be making a lot of money, but both Syncrude and GSOS were operating showing that it can be done and so a lot happened. And, then oil prices crashed about 1986. Boom, the oil went back to damn near \$10.00 and a lot of the momentum stopped and OSLO never did occur. I mean other folks went on with other projects later. So, there was a big enthusiasm in the mid-80s that kind of went back with a thud, if you will, in



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



the latter 80s, because of oil prices collapsing. So, I was in the middle of that a little bit and we did a lot of engineering, but we didn't build many new projects. So, my next involvement if you fast forward now to the early 90s, I now joined Suncor Energy in the early 90s. Suncor of course was the operator of the original oil sands mining operation and that was the core of Suncor. Again, I wasn't directly involved with the operation in Fort McMurray, but I was executive vice-president in charge of the conventional business. I was part of the senior executive team in Suncor. As a matter of fact, when Rick George came in -- I have to go back a little bit. Suncor, in those days, was owned 75% by the Sun Oil Company out of Pennsylvania and 25% by the Ontario Government. That had been something that had been created in times of the oil crises and the National Energy Plan and all those kind of things. They were both losing interest in the company, quite frankly.

There is an old joke that in 1991 you could've bought Suncor for \$1.00 and nobody would buy it. The reason for that, it was expensive operations, wasn't making very much money, had fires and reliability problems and of course, because everything was at a single train, when you had a problem everything went down. Beyond that, its leases were running out. I mean the leases they were mining had at most, another eight or ten years left and there was no future beyond that. So, who wants to buy this thing? All you're buying is a liability for cleaning it up ten years from now and probably not a chance to make any money in the meantime. So, that was the trauma of 1991. Rick George came in and he had been a Sun Oil executive in Great Britain. He came in and took over Suncor and he hired a new executive team. I laugh, I say the first person he hired was me, but it was to take over the conventional business. So, I joined his executive team and we hired other people in and had a whole new team.

PMB: On of the first things that he did essentially was to make it independent of Sun Oil Company in Pennsylvania.

STEWART: Well, two things happened. Actually turning around oil sands as a concept happened first. In 1991, we actually brought in McKinsey Consultants, world-wide consultants to look at the whole thing. They are a world-wide, high powered consulting firm. They came in and worked with us to say, "What can we do?" Rick George, said, "Hey. We're either shutting it down or we're going to make it competitive with world oil. We can't struggle along the way we're doing now." So, we brought this in and came up with a concept for changing the operation and therefore growing the operation. I'll elaborate on that a bit in a minute. So, that was happening '90, '91, '92, '93 the concept of turning around oil sands operations within Suncor. Pretty heady times, because suddenly we thought there was a future whereas we weren't sure when we started.

At the same time, because both Sun Oil and the Ontario Government had lost interest, quite frankly, in Suncor. Rick promoted the idea, "Well let's take the company public and sell it off to the general investor market." Well, they weren't going to buy in in 1991 either. You could've bought the whole company for a \$1.00, so who's going to invest in it? By the time we got to 1993, 1994, we had these concepts of turning around oil sands; changing its operating mode, changing its cost structure and going to build new projects. Eventually, we built some new mines: Millennium and Steepbank and what have you. By the time we had a story to tell, it was now '94-'95. Steepbank: that was the



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



name of one of the new mines Suncor created. The second one was Millennium, which was because it happened about the year 2000 and nothing magic in that. So, anyway by the time we got to '94-'95, we had enough of a story to tell that said, "Hey. This company is worth investing in." So, we took the company public and Sun Oil and the Ontario Government sold out. It took a couple of years to finish the deal, but eventually (I forget the exact year, but I'll say '96 maybe '97) Sun Oil and the Ontario Government no longer owned any Suncor. It was now a publicly traded Canadian company; so, again, heady days. We turned around not just a company but basically an industry and it was pretty heady stuff.

PMB: One of the ironies of that is that Sun Oil and the United States now have a market capitalization of about \$3 or \$4 billion while Suncor is...

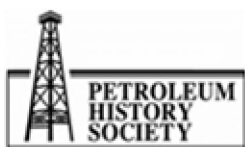
STEWART: \$50.

PMB: Is \$50 or \$60 billion, depending on the market.

STEWART: Yeah, yeah. Those of us that stuck with the Suncor part did alright, I guess. So, I know you've talked to other people. People like Cliff Britch and folks. We always laugh. We hired Cliff Britch to be the vice president of mining. You know it seems silly. They've been mining for 20 years and they hadn't really hired a miner. All these oil guys were trying to do the mining and so, silly little things. But, the big changes they made. It got labeled "The Truck and Shovel". That became the label, because the old way they had these big bucket wheels putting the sand on these long conveyor belts that eventually went miles back to the processing plant. Big cumbersome things, high cost to operate, but also if they go down you're whole streams are breaking down.

The concept of truck and shovel was you had many more parts; smaller parts, still big in size and therefore the reliability went way up and the flexibility. I am sure, Cliff has talked about things like that, but I am not a truck guy. But, when you learn the key is transmissions and tires; as transmissions got tougher and tires got stronger and bigger, it allowed the scale of the so-called, Truck and Shovel to expand. That was the high profile change, but it was much more than that, because of going to that operation, they had more reliability. Again, you're mining a deposit and when you got these big bucket wheels going whatever you run into today, is what you get. So, some days you get very rich ore and some days you get very poor ore. So, the operation was very erratic. Whereas, especially when you had the concept of big steam shovels and various trucks, you could mine manage a lot better. You could actually plan to have a steady quality of sand come in. You can mix and match from different parts of the mine.

So, Cliff would, I am sure elaborate on it. Suddenly, the reliability and the steadiness of the operation went way up which, of course, affects cost. The other thing that they did and this was probably the next big breakthrough in thinking, up until that point both Suncor and Syncrude turned out what they called synthetic oil. Basically, they took the oil sands, separated the oil, the really heavy bitumen from the sand through a hot water frothing prospect. And, then they went through an upgrader where they basically --oil is carbon and hydrogen and the heavier it gets the ratio of carbon is higher,



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



the lighter it gets and or more easy to flow, the ration of carbon is lower, more hydrogen. So, the way to take heavy oil to light oil is you either take carbon out or you put hydrogen in. They talked about cokers, which are machines, big high pressure towers that extract some of the carbon from the oil and as a result you have lighter oil. That's what they were doing up there. Other processes involved adding hydrogen in a high pressure way which we called hydro-treating, hydro-fracking. So, you lighten it up by adding hydrogen. So, all of these big refineries and big processing plants you see are either taking carbon out or putting hydrogen in. That's what they're doing. It's big and it's costly and it's complicated, but that's really what they're doing.

So, anyway both Syncrude and Suncor were basically taking some of the carbon out so that it was light enough now that it would flow in pipelines. It was useable in conventional refineries and they would ship it off to refineries in Canada and the United States, where they would sell it to those refineries to turn it into gasoline and diesel and other hydrocarbon products. The problem with it was it was a one-size-fits-all synthetic oil. Yes, it could be refined, but it wasn't ideal for refineries and so it always sold as a discount. If you have conventional oil and you have this synthetic oil, synthetic oil sold at a discount because it wasn't very usable by most conventional refineries.

So, the second change that Suncor made then in the mid-90s was saying, "Well, we're not going to do that anymore. We're not going to send out a one-size-fits-all product. We can get product. The pipeline network in North America is good enough now. We can actually create a product here in Fort McMurray and send those specific molecules to a refinery anywhere; whether it be in the middle of Chicago or in the mid-west U.S. or Edmonton." So, they went out and worked with refineries and said, "What would be the ideal make-up of a crude oil for your refinery? How you can improve your yields?" Back in Fort McMurray, they added equipment that was able to fine-tune the product. I think they're turning out 15 or 20 different blends now for specific customers to help them basically expand the capacity of their refineries without investing capital. So, those are all the things that turned the industry around: the mining flexibility, the mining reliability, making a new slate of products that could be marketed at a premium now rather than at a discount.

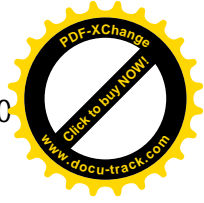
PMB: Now let me ask you this: These different blends that can be created are they all created by hydro-treating or coking or do they add other products in with them?

STEWART: Well, it's basically a process. I am not a chemical process engineer, but it's basically processing that does it. They don't add anything else. Now, one part of the industry that adds things is when people are trying to sell the bitumen that's unprocessed; this heavy oil. It doesn't flow very well in pipelines. Now, there are refineries that can take that bitumen if you can get it there, but you can't get it there very easily. So, what people do is they dilute it with what is called a diluent. So, they take some lighter oils and they blend it with the bitumen just so it can flow in pipelines to get it to the customer. At the other end, they separate those other two out again and then process the bitumen and often send the diluent back to be used again to move it. Now, that's how you market bitumen, but the synthetic oils are really processed to get to their final product.

PMB: Okay, good.



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



STEWART: Okay. But, the other thing and I guess this is where my story gets a little more personally involved. We had McKinsey come in as I say in 1992 give or take and did this study and turning around the oil sands operation and the mining operation and the processing. But, at that time people were starting to talk about the in-situ, the SAGD and the in-situ projects.

PMB: Oh, and you were involved in conventional oil?

STEWART: I was running the conventional side.

PMB: So, this was kind of like conventional?

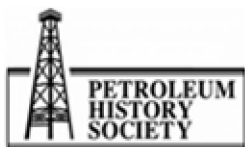
STEWART: The SAGD responsibility wasn't in Fort McMurray. It wasn't in the oil sands operation at all. It was in my segment of the Suncor business. We had lots of leases, but the area we focused on at that point in time was the Cold Lake area. We had a lease that was called Burnt Lake, but it was near the Cold Lake operation. Again, in those days as I mentioned, SAGD seemed to have a better chance than the gooey oil of Cold Lake than the sandy oil of Athabasca. So, we're still thinking the Cold Lake area was the best place to apply it.

As I mentioned, the old story about Roger Butler. We found a place called Burnt Lake where there was a reasonable thickness of this oil in the Cold Lake area. So, we said, "That's the place where we were going to apply it." So, we built a pilot project and tested it and did all that kind of thing. The fellow that reported to me, a guy named **Derek Baker**. He was the vice president of heavy oil in my group. He was convinced that SAGD was going to work and he was a disciple of Roger Butler's. He was the one that was pounding the table within our shop saying, "This will work, this will work; this can be competitive versus mines and be competitive versus conventional oil." He managed to convince me and between the two of us managed to convince Rick George.

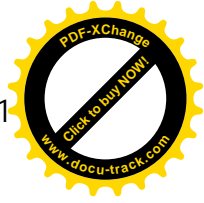
PMB: His name was **Derek Baker**?

STEWART: Yeah. He was the vice president of heavy oil in those days. So, anyway we did our pilot work in the Burnt Lake area and had a number of other leases. So, now we're talking 1994, '95, '96. We were starting to get enthused about the concept, but at the same time, **Derek** had maintained contact in that whole heavy oil world and certainly with Roger Butler's work at the Underground Test Facility. And, the idea that this could work in Athabasca, not just in Cold Lake, but SAGD could actually work in Athabasca. Now, in 1992 nobody would've really believed that other than Roger. I think other than Roger I don't think in 1992 anybody believed that. By 1995, '96, with the UTF thing going, yeah, maybe it could work. Drilling was starting to improve. The technology of horizontal drilling was improving and everything else. So, by the time we got to '96, "Damn it. You know, maybe it will work in Athabasca."

So, it came (I forget the exact dates, but I am going to say that it was 1997), because I remember the first land sale. We, Suncor had I think about three townships of land off to the north-east of the mining area. This area was called, Firebag. Now, these deposits were too deep to mine. So, you were going to have to do something with wellbore. So, anyway we had these three leases that were called



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



Firebag; three townships. Unlike conventional business where you buy it by a section, you buy them by parts of townships when you were doing heavy oil in those days. So we had these three townships and we looked at it saying, "You know what? It's deep." We're talking now 1000 metres; 500-1000 meters. You couldn't mine it, but boy it looked good. It was thick, continuous, thick and just ideal. You have 30, 40, 50 metres of continuous sand which is just perfect, because the thicker your sand is, it proves everything. Number one, your capital cost goes down because every time you drill a wellbore there is that much more to recover. So, the capital cost for the reserves you're getting is much better. Similarly, the bigger reservoir you have, the more head you have on it, the higher the production rate you're going to get, because gravity has more to give you. So, you get higher production rates which are lower operating costs. So, the thicker your reservoir, your capital cost and your operating cost go down.

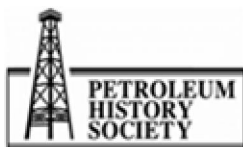
Another big part of operating cost of course is the cost of the steam to inject in the reservoir and a big problem that you have with SAGD is a lot of the steam gets lost to other rocks. You can't just control it. You can't just say, "Hey, steam just heat up this rock." It heats up the stuff above and below and beside. So, the thicker your oil sand is, the more the heat that's going to it you want it to be in and the less of it is escaping; so the thicker your sand, the better. That's capital cost, operating cost and steam ratio. So, Firebag looked great. So, it was **Derek** actually, **Derek Baker** who convinced me and between us we convinced Rick George that we're going to Athabasca. We're not going to the Cold Lake area. We're going to Athabasca. Over the next couple of years, we actually sold off all of our oil sand leases, including Burnt Lake to other companies. We said, "No, we're going to Athabasca."

The exciting part of 1997-1998, was buying these other leases up there. As I said, it would come up. The Alberta Government has these land sales every once in a while. They post land and people bid on them in a closed auction process. Well, over the next two years, we bought another seven townships. We ended up with ten townships of land and what was now the Firebag Project of Suncor.

PMB: So a township is -- I am trying to remember?

STEWART: 36 square miles; six miles by six. So, a township is 36 square miles and we have ten of them. I am sure Prince Edward Island is that big. Anyway, it was heady stuff, but you laugh today, because the numbers are so big in today's capital cost. We were spending tens of millions of dollars on these leases in 1997-1998. That was big money for buying oil sands leases in 1997 for SAGD operations to bid ten million bucks here and ten million bucks there. That was heady stuff and that was one of my key responsibilities. You get into numerology and all sorts of stuff when you're putting bids together and how it works.

As a matter of fact, there was even a tale that was told. I won't quote the name. After one land sale, we heard that one of our competitors actually brought in outside people to do an electronic sweep of their offices, because our bid was so close but just a little bit above theirs. They figured somebody had been spying on them. We hadn't of course. We just got lucky on that one. But, they actually did



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



an electronic sweep of their offices thinking somebody must've known our bid to beat us out by that little wee bit. So, land sales were always exciting. Anyway, over '97, '98 we ended up buying this big swatch of land which is now Firebag. If you look at Suncor today, they're growing. Suncor as a company produces about 300,000 barrels a day or something. Their Firebag in-situ oil production today is their fourth phase is now operating and there's somewhere around 150,000 barrels a day, maybe 180,000 barrels a day of heavy oil produced out of Firebag with SAGD. If I have a bit of a legacy in this industry I think it is Firebag. Of course, I give full credit to both **Derek Baker** who pushed on us to convince us to do it and Rick George who said, "Yeah, go for it." So, I was the guy in the middle of it.

PMB: Now, we're sort of at the end of the 1990's and I want to ask you a specific question about this. A friend of mine, Gordon Jaremko has just written a book about the energy regulator. What used to be called the ERCB. He said that in 1971, the provincial government made a policy that there should never be more than two of the above ground mining projects constructed at once. That was government policy, but it was kind of lost in the shuffle. In 1998-'99, all of a sudden you had about five or six large projects where it's the Suncor expansion, the Syncrude expansion, the CNRL development went on, Shell's big project and there was another one (I forget what it might've been). So, there were a half a dozen big projects that were being developed around the year 2000 all at once. Do you happen to have any memory about what the environment would've been like for the producers/developers at that time?

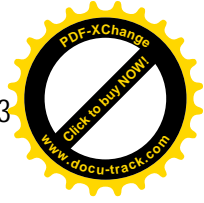
STEWART: Well, history shows what happened, there was a frenzy. All these big projects were coming, maybe the old policy had been in place, but the government of the day in 2000 give or take, wasn't about to pick and choose. "Hey, you Suncor can develop. Hey, you Shell can't." There was no political will to be picking and choosing the winners. As a matter of fact, I think that it was Ralph Klein who said that the government's business is not to be in business. Let the business world sort out things. That result was of course, there was a lot of competition both for the land as I mentioned up front, but now for people and engineering firms and operations folks; bringing all these people in to build and operate all these new facilities. So, that put a lot of pressure on cost and everything else. So, we saw that. We saw the huge escalation in cost. Just because demand was up and engineering firms, supplies and people were in short supply. So, when you thought you were going to spend a \$1 billion, suddenly you spend \$3 billion to do something. It was sobering and yet oil prices now were not worth \$20.00, they were \$100.00.

PMB: Of course there was a lot of environmental damage as a result of that at that time. We have Peter Lougheed at least standing up and saying at that time, "This is wrong. This should not happen. This is causing all sorts of social dislocation," and that kind of thing. I am going to give just a quick lecture on this. Ralph Klein when he retired, when he announced his retirement from the premiership basically started crying and said, "I really screwed it up," in a news conference.

STEWART: Again, how do you get government to pick and choose these things? Certainly the big issue that gets much more profile now, is the environmental impact. Again, what we're talking about is technology. I think companies will always try to do the best, but you do the best within the



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



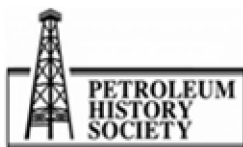
economics of your operation. Oil is \$10.00 or \$20.00 and also within the technology you have available. One of the problems you have when you do the old processes of mining and separating the oil from the sand, you get all these little fines and they go into what they call tailings ponds. Eventually, that settles out and eventually those lands get reclaimed. The original tailings ponds of Suncor and Syncrude have been reclaimed and now they're meadow lands with animals on them. The problem is that they are ugly when they exist and they take decades before they get reclaimed. So, there's that whole period of ugly looking things that are going to be decades away from being reclaimed. But, they do get reclaimed.

So, what's happening now is you find the challenge of new technology so you can get tailings-free operations and people are doing more and more things like that. I am now retired, but you mentioned that I am on the board of Newalta; actually I chair the board of Newalta. Newalta is actually an environmental services company. It's not an operator of oil sands at all. It started by doing the conventional oil field. We've expanded across the country and into the United States. We do use oil re-refining in Vancouver. We re-process lead at a smelter in Montreal. We serve the off-shore industry in Newfoundland. So, we are an environmental service group. One of the new things we're doing and as a matter of fact, it's a project that we built last year and just started up this year, is a tailings pond reclamation project for Syncrude. And for us, we're not a Suncor. We're a small group here by comparison. We spent \$50 million or more on this one facility.

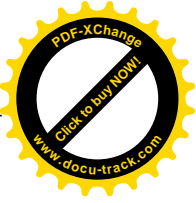
So, our equipment, our people are now inside the Syncrude operation processing those tailings ponds to extract the oil, get the sand cleaned up and in other words, accelerate the reclamation of those old tailings ponds. Also, that technology we're proving it is working now, but it's been a proving exercise. You can see what happens is, those things start to prove themselves out. You're not only reclaiming the old tailings ponds sooner, you can now prevent the creation of new ones, because you can process the tailings as they're created. So, technology will answer this and there are many other people doing many other processes, but if I predicted ten years from now, there won't be tailings going into tailings ponds anymore. There would be technology to solve that problem and it will both accelerate the clean-up and prevent the creation of new ones. We're just at that cusp now. So, the solution to all of these issues is technology; cost effective technology. That's happening. There are a lot of people working on that.

PMB: I want to go back with one more question from the 90s. There was an agreement and I am trying to remember what it was called. It was developed by the industry in consultation with the provincial government and the federal government, which basically resolved the tax issues related to oil sands development. I think it was developed and signed around 1994. I have a copy of it at home and I am trying to remember whether you recall or can give me insight on it. I apologize that I can't remember the name of this agreement.

STEWART: I forget the details, but as I say I wasn't directly involved with oil sands operations. The big issue in --if you go back to when these companies were first operating in the 60s for GCOS, the 70s for Syncrude. The government had to help them. The costs were high. Oil prices were low. So, what the government did was two things. One, they guaranteed them access to the market place. In



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



those days there was more oil production in Alberta than you could market. So, they actually had a pro-rationing system and every oil well in Alberta was limited in how much they could produce every month. From the 60s to the 70s, right into the early 80s, every well was regulated what it could produce. So, the first thing they said was that these plants could sell what they produced, because they just needed to get the volume out. The second thing was they were allowed to write-off their cost before they paid significant royalties. They were paying a very low royalty rate until they had their payout of their capital. That was the case for both projects through the 70s and 80s. What came to a head in the 80s is the government was bringing in royalty regulations that wanted to collect more sooner. Governments like to collect more money sooner, of course.

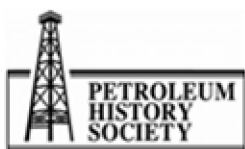
These new projects were starting to be talked about, so they were bringing in a new royalty regime for oil sands development. So, what would that look like? What costs could you deduct and how fast could you deduct them before you paid higher royalties? So, where all the negotiating took place, there was a lot of noise around it of course. It was both the grandfathering, as they called it of both the Syncrude and the GCOS projects, the old project. But also, a fair enough sharing for new projects that, one the government would get more, but also be enough left for the projects left to go forward. So, there was a lot of toing and froing on the structure of the royalty in those days. One of the big issues had to do with what costs were legitimate to include in this royalty deductions system.

As I mentioned, whether you mine it or use SAGD wells, you produce oil and you get this bitumen, if you will, to the surface or to the plant. You could think of that as being the production, the operating and production piece. In the conventional business, that's where you pay your royalty. Now, all of a sudden you had these big processing plants in behind that were creating these synthetic oils and these special blends, huge capital costs. So, were those costs part of the royalty deduction? Because, yes you're selling a product of the back end of that, but is that any different to selling conventional oil to a refinery in Edmonton who turns it into gasoline and diesel? So, there was a big debate on it. At what point is the royalty collected? Is it when the bitumen turns up at the plant or is it when these products turn up at the back end of the plant and therefore are these plant costs deductible?

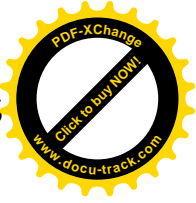
Well, like everything else it was negotiated and finally resolved, but those were the issues that people were working on. Of course, the industry said we're putting in billions of dollars now for projects, high risk, high cost and we've got to be able to recover that before we can pay significant royalties. Of course, the government was saying, "Hey, we've got to get our share sooner. It's all fine, but we need money now. We can't just wait ten years before we start getting things." That was what the debate was all about.

PMB: But in the end, the deal was that after you had recovered these, the company would pay a minimum royalty until the rest of these deductions were made. And, then at that point, the royalties would start going up substantially.

STEWART: Exactly. Again, you talked to others that were more involved in the detail, but another issue of course was what they call, ring fencing. In other words, each project could be judged on that



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



basis as opposed to each company. For example, if you're Suncor and you have this project and you go to the next one and the next one and the next one. Do you get to deduct your ongoing costs of expansion against all of your production or only against the cost of those expansions? You can see what would happen is that when you keep expanding and keep spending billions of dollars if you can deduct it against your total operation, even those early operations aren't going to be turning in royalty payments for some time. The government said, "No, no. That's not right. Once a project is paid out, we should be getting a royalty from that piece." So, that was all part of it.

PMB: So, they applied the ring fence?

STEWART: It was all negotiating and it was all what happens. It obviously resolved itself, because there are a lot of projects going on today.

PMB: You're an amazing wealth of information. Where else do you want to take this? I think we've only gotten to a certain part in your career.

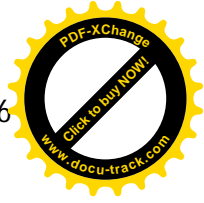
STEWART: Well, that's about my career, if you will. I retired in 2001. Firebag was a reality. The first project was starting to be built at Firebag when I retired. Now, the last ten years I've been retired, but I've been on some board of directors. I mentioned Newalta, the environmental service group. I have also been on different oil and gas companies. One company I am on the board of right now is Pengrowth Energy. The reason that I bring that up is that here's a company that was one of these oil and gas trusts in the conventional business. Today it produces conventional oil and natural gas. But, its core future and we've articulated this quite well, is an in-situ heavy oil project in the Cold Lake area. The lease itself that we're on is called Lindberg. The reason I say that is that is, it is full cycle again. I mean these are thinner reservoirs with the better oil, but again the technology of the horizontal drilling, the technology of being able to build and recycle some of the produced water to get the operating costs down.

Suddenly, we're saying we can go back to some of these reservoirs that we pushed aside back in the 90s. Now we can go in there and take the technology and the SAGD concepts and the new abilities and go back to these reservoirs that we said weren't economic 20 years ago, when the "Firebags" were being pushed, going back there and getting quite excited about it. What makes these deposits exciting is we can handle now the thinner reservoirs on an economic basis through the technology of drilling and completion and water processing and what have you. What makes them exciting is that you have a much lower operating cost, because the oil quality is better. It flows easier and you don't need as much steam. Creating steam is the highest single cost in SAGD, steam-assisted gravity drainage. Well, steam assists the gravity and so steam cost is very high. A place like Firebag, which is probably one of the leading projects in Canada, it takes about three barrels of steam to produce a barrel of oil.

So, that's high cost. In a place like Lindberg, we're now taking well under two barrels of steam per barrel of oil. Well that makes a big difference to your operating cost and therefore the economics of going after these other deposits. So, all I am saying with that example is technology will continue to



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



go forward. The more deposits will become economic. Environmental solutions will be found because the incentive is there. Everybody knows that they've got to do this to have a social license to operate. Technology is going to keep improving and improving and improving.

PMB: That's a really important message. But, there's another question here, as you know. About four or five years ago, natural gas prices essentially collapsed and I don't know whether I am right or wrong but it seems to me that ultimately they will probably recover, maybe even quite a bit. (a) Do you think that will happen, and (b) let's say there is a doubling of gas prices from where they are today, how much would that effect operations?

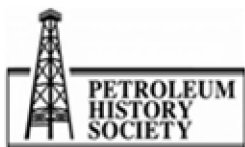
STEWART: Well, obviously gas prices mean for an oil sands operator, a gas cost. You're buying gas to generate steam. So, unlike the conventional producer, they love to see higher gas prices because they sell their natural gas. But, when you're an oil sands operator, you're buying gas to generate steam. So, it's a cost and I think you understand that, but just to put that in context. Yes, gas prices collapsed at under \$3.00, well under \$3.00 for a while. I think, number one, most oil sand operators are predicting gas prices to firm up and therefore they're doing their economics when they make commitments assuming gas will be higher than today's low prices. It helps them today, but they're not assuming that it's going to stay down there. So, oil sand operators presuming that gas prices will go up again. As prices go up, yes your costs go up and you have to find ways to be more efficient. What do I think about gas prices? Well, forecasting prices is a folly we've all been doing, I've just been doing it for 40 or 50 years. Get back to cost of supply and the long term is cost of supply.

What has happened with the technology now with these horizontal wells, these super fracks; suddenly these resources that were uneconomic are economic. Suddenly you're producing a lot of natural gas in Pennsylvania. In deep parts of the south of U.S. that never had production before. Here we're talking about this deep gas up in Northern British Columbia that's going to go into L & G projects for Asia. This is gas people knew were there, but nobody believed would be economic. So, the technology improves, these resources become commercial and the cost of supply will set the long term price for a commodity. Will gas prices get back to \$4.00, \$5.00, \$6.00? I think so. Will gas prices, other than on short term blips get to \$10.00, \$12.00, \$15.00 as they did for a little while? I don't think so, because I think that the supply cost on a world basis now because there is a lot of natural gas in these tight formations worldwide, will settle it down to a middle ground I guess is where I think. But, that is one million of a thousand opinions you can get on the price of gas so.

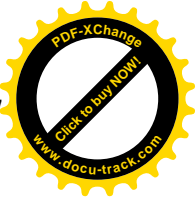
PMB: As somebody said, "When you predict the future of a commodity price, the one thing you can be sure of is you're wrong."

STEWART: Yeah. Well, that's when you learn there is a difference between planning and forecasting. The planning takes into account all of the possibilities and you think you're in the forecasting business rather than the planning business; you could get bitten pretty badly.

PMB: The other thing that has been really important in the last three years and it's a follow-up from the shale gas is the tight oil. What I find very strange is there is this new technology that has this



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



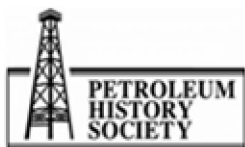
bringing in a lot of oil from reservoirs which can be accessed through fracking now. People hadn't really thought about that until fairly recently. And, yet to this day in 2013, the oil prices are still up in the \$100.00 range.

STEWART: Well, the reason for that is that it takes about \$100.00 for those kind of reservoirs to be economic these days. You could debate whether it's \$85.00 or \$95.00 or \$105.00, but the technology of the drilling and the super-fracks and what have you -- a single well you drill into Cardium Formation here just north of Calgary these days costs \$4 million. That is one well to go down there. Yeah, it might produce a few hundred barrels a day for a while, but it falls off. So, it takes \$90.00 or \$100.00 to make most of those things economic. The difference is we're not seeing \$150.00 dollar oil. You may recall we saw that for a little while back five, six years ago. So, is it going back to \$50.00? If it does, these projects will stop. They can't operate. But, the fact is that they're economic now at \$100.00, whereas before they weren't economic at any price and you certainly don't need \$150.00 which oil price was going to not that long ago.

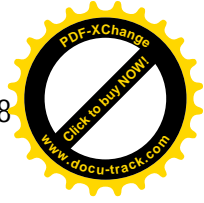
PMB: Now, it's my understanding and I want to follow-up the economics of this just a little bit. It's my understanding that Cenovus, for example, can produce its bitumen for around \$50.00, \$55.00 a barrel. So, the fact that there is this kind of disparity between the tight oil and some of the in-situ bitumen really is to the advantage of a lot of the oil sands companies; true comment or not?

STEWART: Directionally, but not quite true. There are two reasons for that: One, bitumen is not light oil. These tight oils are light oils, so they're much more valuable than bitumen. So, right off the bat there's a gap. Pick a number: \$20.00, \$25.00 a barrel, just a quality difference. So, you can't compare bitumen prices to tight oil prices, because they're a different commodity and the one is worth an awful lot more. Second, when you're talking about the world that consumes, 75 million barrels a day, even Canada produces 3 million barrels a day, the world is setting prices based on the total cost and the incremental cost of new production in the world and the incremental demand. So, you can't say, well here's the best project that exists. Say, Cenovus has one of the better projects, but that somehow will set the prices for everything. I mean, they benefit by having a very low cost, high productivity area within the whole spectrum of what's out there. But, they're not going to be the price setter. They're going to be taking the benefit of having a good resource, but that's not average.

So, the fact that one guy can produce it, that doesn't mean the industry can produce that or that we can get significant supply in at those prices. So, the market works. It balances; as oil comes on, the price changes. Why is oil for light conventional oil bouncing around at \$100.00? Because, that's what it takes to get enough total production. Why is bitumen discounted to \$50.00? Because, that's the gap you need to make it economic to transport it and process it. Why is conventional oil in Alberta selling at a \$20.00 discount to WTI? Because, we can't get all of our oil to market without paying higher costs. The pipelines haven't expanded yet. People are using trucks and rail, which are higher cost operations and so therefore by definition, the net back to the Alberta producer goes down. So, the market balances all of those things: quality of oil, transportation costs, access to specific markets and refineries and the guys in the supply business they minute by minute are doing that. Worldwide these guys are trading and pricing oil by the minute, balancing out all of those things.



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



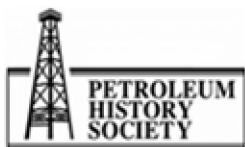
PMB: Now, you're giving me such a wealth of stuff. It's a little but hard to keep in charge of this. Let me ask you just a couple of the simple questions from this. When did you first learn about the oil sands? Do you have any recollection of that?

STEWART: Well, we know historically it's been known for a really long time, but that's just reading the history books. I joined the oil industry for all purposes in the mid-1960s. So, Great Canadian Oil Sands was built in the late-60s. So, you were aware of it. You maybe didn't know an awful lot about it, but you were aware of it and certainly when that project started and I was living out here in the west in those days, the size of resource was always talked about; the billions of barrels, the billions of barrels. How can it be economic? How can GCOS possibly be spending that money in this environment? How do they ever hope to make money? But, certainly this resource potential was talked about a lot in the 60s when GCOS started up. So, certainly became aware of that and the Cold Lake concept at Imperial Oil where I worked, people around me were starting to get involved with Cold Lake. This looked like the most accessible oil, the quality of it.

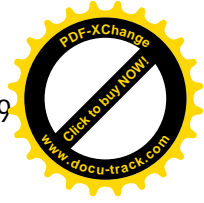
As I mentioned, people like Bob Petersen got transferred in to lead the Cold Lake initiative and he was a high flying manger in those days and with the commitment of people like Bob to it, people like Dr. Don Townsend doing his research on production from Cold Lake. We were both in the Exxon production research laboratory down in Houston at the same time and that's why I got to know Don. I was involved with the conventional side and he was involved in heavy oil, but we were next door neighbors in Houston back in 1966 -1967 where people were working on those things. So, when you join the industry in my generation in the 60s, you heard about it. You weren't sure about it, but you heard about it. People were staring to get excited. We can do something here maybe.

PMB: I want to mention and issue that is very topical, has been very topical in the media in Canada this week. That is the issue of crude oil transportation. As you know, there were terrible floods in Calgary a few weeks ago and one of the averted disasters is when a train was caught on one of the bridges just outside downtown Calgary. There was a lot of heroism and eventually that train was emptied. It was secured and then it was emptied and then it was taken off the bridge before it actually fell into the river. I think it was six tank cars of diluent of some sort. So, that was the first thing that happened and then of course, last weekend was the horrible disaster in Quebec in which a train, I think it was 77 cars went off the rail for reasons we don't know and went into this little town and destroyed the center of the town in Quebec. It killed, nobody knows how many; probably nobody will ever know how many, but probably scores of people. Now, this has raised the question about the issue of transporting oil and a lot of it is bitumen by rail car, whereas most of us agree that pipelines are a much better option. Would you comment on that please?

STEWART: I cannot comment. I am almost commenting on this subject as a layman, because I am not a transportation expert and I know little about railways. So, I can observe, but I am not sure I am a credible witness, if you want to call it that way. I think that these tragedies did occur. I think it's safe to say that the reliability of transporting big volumes of liquids through a pipeline is much more reliable and much safer than rail and statistics would tell you that. There has been controversy about pipelines, because pipelines do leak once in a while and there have been some high profile issues on



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



those and that's led to regulatory reaction and public reaction. We see how the Keystone Pipeline is still held up in the American administration. We can see the reaction of the British Columbia Government and a number of people to a pipeline to the west coast. Even the pipeline they're talking about building from Alberta to Atlantic Canada. People are saying, "Well, do we want a pipeline coming through here?" And, Quebec is asking those questions. So, pipelines are getting reacted to and certainly I assume some of those will get approved and they will de-bottleneck the problem. Having said that, the oil producer has produced oil and he has to get it market and this phenomena of getting on rail, didn't exist. It just did not exist a few years ago.

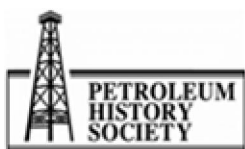
All of a sudden now, we've got a 100, 000 barrels a day moving on rail from everywhere; from Alberta to Louisiana, from Dakota to St. John, New Brunswick. It's just amazing how much oil has moved. Trains have accidents. Turns out the ones we've mentioned had oil cars on them, but there are all sorts of chemicals that move on the rails. There are all sorts of commodities that move on the rail and when accidents happen, they get spills. I just have to believe that the common sense of pipelines being more reliable by an order magnitude has to allow more of those to be built with all sorts of controls and regulations. Again, we're back to technology. The control of pipelines, the quality control of building them, of monitoring them and everything else is going up. I think regulators will demand that the highest standard be put to them, but that still is a right solution versus another 100,000 barrels a day or 200,000 barrels a day going on rail. That's a short-term solution in my way. But, the market works. I've got oil in Alberta and I can't get it into a pipeline, I put it on a rail car. That is what has happened. An amazing amount of that has happened in the last three, four years.

PMB: Part of the reason that the rail cars are being used so much more frequently is that there is just so much more oil that has to go to market. I understand that MEG Energy is taking it to the end of the line and then putting it on barges down the Mississippi.

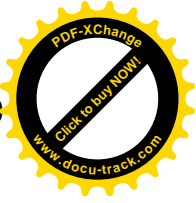
STEWART: I don't know that specifically. It makes sense. You want to get your oil to market. The biggest market in North America is the Gulf Coast of the U.S. where all these huge refineries complexes exist. That is why the XL Pipeline is trying to get oil from Alberta to the Gulf Coast. That is where the big oil processing center is in North America. So, whether it be by rail, by barge or by pipeline, people incrementally need to get their oil there.

PMB: Okay. As I've said you've given me a lot of information. The effectiveness of government in the regulation of the resource: Whatever comments you have on that? I am quite influenced by this book I read recently about the ERCB and the idea of the Tragedy of the Commons, there must be a regulator to prevent the Tragedy of the Commons. So, anything you have to say on that and the effectiveness of regulation of the resource within Alberta?

STEWART: I am not sure what the phrase, Tragedy of the Commons? Is that just the common good gets impacted or...



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



PMB: Yeah, well the idea is that if there is a common pasture, for example, then if all the farmers bring their cattle onto that common, eventually the grass/the resource there will be over consumed to everybody's loss. And, that's the idea of the Tragedy of the Commons.

STEWART: Fair enough, okay. Well, regulators have a lot of responsibilities and certainly regulators in our industry here in Canada and certainly in Alberta particularly have been world leaders in that. The original Oil and Natural Gas Conservation Board and ERCB as it became known later under the guidance of people like Dr. George Govier became the world leader in oil regulations. George; you should talk to George. He's a fine man.

PMB: We have interviewed him actually.

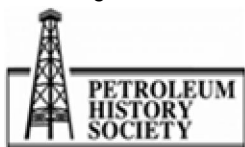
STEWART: Okay. But, George led that and the point was when you're regulating an industry you have to demand standards and you have to still be realistic with what was available at the time. I am back to technology. I am back to cost. I think the regulators here have always been proactive setting high standards and as technology improves, as cost effective things come into to play, they step up the regulations. They demand that people improve. So, what might've been an acceptable degree of air release from a gas plant 20 years ago wouldn't even be close to being approved today, because technology has improved. Similarly, when people used to have flare-pits by their wells, because they couldn't get rid of the sludges and stuff; you don't have flare-pits any more. So, my point being, I think the regulators have a big job to do. I think that people recognize it and I think in our case have done a good job of keeping up with what's available to be done. You can't say, "You must do this," if it can't be done. I mean, that's not regulation. That's just some other stuff.

PMB: But, today's best practice becomes the minimal standard tomorrow.

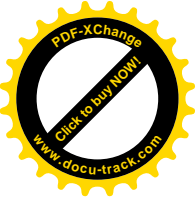
STEWART: Exactly. We all do that. I mentioned like our Newalta project here on the tailings ponds and the oil sands. Well, once we prove that happens, the regulator is going to say, "Hey guys, there's now a solution. Pick up the pace. Pick up the standard." But, until you prove there is a solution, you can't just demand something happen. You can't wish out of thin air and I think the regulators here have done a pretty good job of trying to keep up and demand that the standards that can be met are being imposed. We see it. As an operator, I look at the conventional oil operations and their standards, their demands are increasing all the time, because they know it can be done and more power to them. I think that is responsible. Quite frankly, as an industry, if we don't have those kinds of regulations so, again, use the phrase The Commons, but we as an industry are vulnerable to the publicity. The negative publicity comes with the weakest link. If one operator messes up, the whole industry gets tainted with that.

PMB: Syncrude's 3000 ducks or whatever it was.

EWART: That was the same weekend I think a hunter shot more, but it doesn't matter. So, regulators ensure that there are those, minimum standards. But, increasing standards apply to everybody and we all benefit from that. Many of our companies, that I am involved with, feel proud of being a leader in some of the things like the environment. But, you only get so many credits as an



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



individual company. The industry gets judged as a whole much more so and that's why I think they're doing a good job and will continue to improve the standards and demands. That is just the cost of doing business.

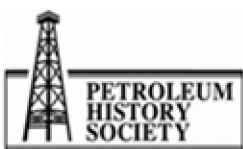
PMB: I think that we're almost to my last questions and then to whatever else you want to say to wrap-up. As you are an environmental company, but increasingly in areas like Fort McMurray and Fort McKay and so on, there's a lot of concern about how the industry deals with aboriginals and with local communities; a very important issue. Is that something your company is involved with at all? Let's start with Newalta.

STEWART: Well, not directly. I shouldn't speak for Newalta, because I don't know their detailed operations. I am on the board. I am not a member of management. We're not an oil and gas operator. We're out there just basically processing waste. We call it engineered solutions. We're not just hauling it away and dumping it at a landfill, we're processing things. So, we're going in there to help solve environmental issues by processing. We have very few operations. For example, I mentioned that we built this one facility inside Syncrude. That's probably our only physical facility we have inside an oil field. We're a pimple. I mean what we do is a pimple on a piece of Syncrude.

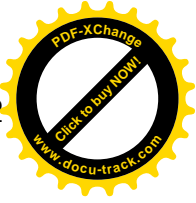
So, I think most of those issues are being addressed by the big operators, the Syncrudea, the Suncors, the Shells and the Imperial Oils. They have the big impact on the communities. I know they have proactive programs. I mean, not just hiring people into their operations, but hiring contractors out of the local people who can create their businesses and supplies and services. That's been proactive for decades. The communities that are right there have a lot of commercial support from the big operators. As a small operation like ourselves, we don't have the firepower to get involved in big program. We're under the umbrella, if you will, of our customers, because the Syncrudes are our customers, if you think of it that way. So, we really are operating under the umbrella of the programs that the big time operators do.

PMB: This little pimple that you have in Syncrude, can you describe that to me in a little more detail? What does it do exactly?

STEWART: Well, I mentioned these tailings. What tailings are, are basically fine particles of oil and sand suspended almost like an emulsion in water. If you just put them in the settling ponds. That's what they're called, settling ponds. It will settle out, but we're talking decades. We're not talking minutes or hours or days; we're talking decades for it to settle out, because it's almost a fine emulsion. As I also said, there are many people trying different solutions. What we have operating are basically large centrifuges. So, we take this emulsion and through a centrifugal force are able to separate the sand and the oil and the water. So, you get clean water, relatively clean sand and oil coming out at different parts of the centrifuge cycle. Now, it's one thing to have a centrifuge the size of a table top. It's another to build a \$50 million facility that's going to handle hundreds of thousands of barrels over a thing. So, it is simple technology in a sense, but it's the engineering size and scope that is the big breakthrough.



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



PMB: That sounds like the answer to a maiden's prayer up there in terms of dealing with the tailings. Are there other people with similar or comparable technologies?

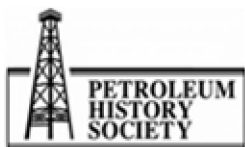
STEWART: Well, we are the leader in centrifuges. We do that in conventional business. All of a sudden, we decided that we can apply it here. This is a leading edge application of centrifuges. Centrifuges are simple in concept, but we're back to the engineering scope and the speeds and size that you can separate tight emulsions. It is one thing to separate simple oil and water or other things, but to separate these tight emulsions is where the thing comes. But, there are many people coming up with different solutions; different kinds and they're trying them. Chemical solutions that will cause these things to separate and settle: surfactants. I know one group that is like dish soap, if you will, but trying to apply a surfactant concept, because it is environmentally relatively benign to help separate these things out. So, the challenge is to find the technologies that are most effective and most cost effective as well as technically effective.

There are a lot of people working on that right now, because the expectations of doing better by the companies and by the regulators are out there. The public and people know that there's a big prize if they can find a solution. There are a lot of people doing it. We happen to be one of them that are supplying this technology. This is almost a pilot plant. It is one step up. We had little many pilots; so, this is commercial demonstration, I think we call it. It's the first time to try and do something of this scale with that product. So, it is brand new. So, I think the term they use is commercial demonstration as opposed to pilot plant but that's engineer talk.

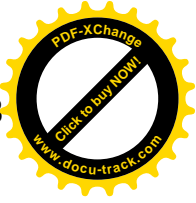
PMB: Okay, one last piece of engineer talk. I understand that every grain of sand in the Athabasca area, every grain of sand has a tiny layer of water. And, then it is first covered with a little bit of water and then it is covered with the bitumen. If that water didn't exist, it would be almost impossible to produce the bitumen. I've never understood why that's the case, any ideas?

STEWART: I am not the chemist here. One thing I do know is that, I am not talking about just bitumen, I am talking about conventional oil; light oil produced all through Alberta and all around the world comes out of rock formations. We're talking about sand or carbonates that are rock and the little holes are where the oil resides. Whether it is sand where it is like little pores or whether it is in big vugs and carbonates, the oil has accumulated in the holes in the sand, in the rock. Normally, the oil has migrated in from some sediment laid down hundreds of millions of years ago and migrated into the rock that has both the space and has a cap rock to keep it in place. So, most oil reservoirs really have had oil migrate into them and displace water, because most rocks underground are full of water.

So, the oil has displaced water and I am talking hundreds of millions of years ago, let alone billions of years ago when this happens. So, therefore there is residual water. Every oil reservoir in the world has residual water content and it will tend to be around the rock surfaces and it's very unusual. What they call those are, water wet reservoirs and what it means is that the first thing in contact with the rock is water and then oil is after that. There are a few reservoirs in the world, but very few that are oil wet, where the oil is actually right in contact with the rock. But, this is just due to the geological



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.



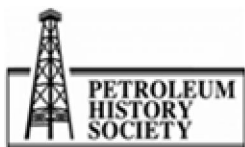
process that has taken place over hundreds of millions of years to create the oil reservoir or the oil accumulations in the first place. So, is there a little bit of water around the rock? Yeah and I will say that almost every reservoir in the world, that's the case. Does it help the slipperiness or the mobility? I guess so. I've not picked up on that, but exactly. That's the way the reservoir is put together.

PMB: Fair enough. I have no more questions. I'd like you to wrap up with whatever you feel you needs to be put on the record.

STEWART: We've covered a lot of ground here. I guess the simple thing I'd say is that, I've been around now for 50 years. I've seen an awful lot of development take place. I've seen a lot of technology improvements take place that allow oil sands, tight oil, tight gas, get produce economically. I've seen technology improve the environmental performance of the industry or just the magnitude from what it was in the 60s and 70s. I just have to say, if I was around 10, 20 years from now, I would be amazed at how much more technology will improve both the production and the environmental impact performance of the industry. It will happen and it'll be driven by better and better technology. It'll be exciting to see it happen.

PMB: Thank you very much. This has been a great interview.

[END OF RECORDING]



Sponsors of The Oil Sands Oral History Project include the Alberta Historical Resources Foundation, Athabasca Oil Sands Corp., Canadian Natural Resources Limited, Canadian Oil Sands Limited, Connacher Oil and Gas Limited, Imperial Oil Limited, MEG Energy Corp., Nexen Inc., Suncor Energy and Syncrude Canada.