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## HASSAN HAMZA

**Hassan Hamza, PhD, Director General, Department of Natural Resources, CANMET Energy Technology Centre (CETC) - Devon** has been the Director General at Natural Resources Canada's CanmetENERGY-Devon since 2004. He has over 35 years' experience in management of R & D programs with a proven track record of initiating and establishing successful multi-million dollar, Federal-Provincial-Industry Consortia that led the way to break-through technologies in the energy and related fields. Dr. Hamza represents Natural Resources Canada on provincial, national and international committees and negotiations, and maintains an extensive national and international network of collaborators in academia, research organization, and industry. He is considered an international authority on solid/liquid separation. He has led and conducted numerous R & D investigations both for Canadian as well as international companies including; National Coal Board, England; Black Sands Company, Egypt; Dow, USA and Canada; Bayer, Germany; and most Canadian and multinational oil companies in Canada. He is an Adjunct professor at the University of Alberta and Dalhousie University as well as being a member of the Industrial Advisory Committee to National Science Foundation, US. Dr. Hamza graduated with a Ph.D. in Solid/Liquid Separation, Mining Engineering Department, University of Newcastle-upon-Tyne, England. Prior to that he received a B.Sc. degree, Mining and Engineering, Cairo University, Egypt and before joining the public service, Dr. Hamza was a Professor at the Assuit University, Assuit, Egypt.

**Date and place of birth (if available):** February 2<sup>nd</sup>, 1940 in Mansoura, Egypt

**Date and place of interview:** Thursday, July 25<sup>th</sup> 2013

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**Name of interviewer:** Adriana A. Davies, CM, Ph D

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**Full names (spelled out) of all others present:** N/A

**Consent form signed:** Yes



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**Transcript reviewed by subject:** Yes

**Interview Duration:** 1 hour and 22 minutes (81:58 minutes)

**Initials of Interviewer:** AD

**Last name of subject:** Hamza

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AD: My name is Adriana Davies and I'm a Researcher/Interviewer on the Petroleum History Society Oil Sands Oral History Project, and today is the 25<sup>th</sup> of July, 2013 and it's 1:35 p.m. and I'm interviewing Dr. Hassan Hamza, who is the Director General at Natural Resources Canada's CanmetENERGY, Devon facility. Dr. Hamza, thank you so much for agreeing to be interviewed.

HAMZA: Quite welcome.

AD: As you know, these interviews are going to reside in the Glenbow Archives with other Petroleum History Society oral history interviews. Initially they did the conventional industry and for the past two years we've been doing interviews with people involved with the oil sands. Now, can we begin by you telling me the date and place of your birth, and then give me a short summary bio that will help me to formulate questions, and of course we're interested in your entire career, not just, you know, your career as the Director here and, and prior to that as ...

HAMZA: Yeah.

AD: ... a research scientist; so then just the date and place and birth and a summary bio.

HAMZA: I was born in Egypt in the 3<sup>rd</sup> largest city in Egypt -- was called Mansoura. It is in the Delta, and it was 1940, in 1940.

AD: And when was -- what month and what day?

HAMZA: Oh, the 2<sup>nd</sup> of February 1940.

AD: Good. So if you can continue telling me a bit about your educational background and then your work history.

HAMZA: I went to school up to high school in Mansoura and then I had my first degree from Cairo University in Mining and Petroleum Engineering. And then I worked a little bit as a TA [Teaching Assistant] at Cairo University and few other universities, like Assiut in Upper Egypt. And then I went on a grant from the Government of Egypt to study in England; so I studied areas related to tailings and so on in coal. I spend about four years there and then I worked at the National -- National Coal Board in different locations for about a year before going back to Egypt; and I worked as Associate Professor, Assistant Professor, Associate Professor and Professor before coming to Canada as a post-doctorate. Worked for two years in Canada; went back to Egypt to



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work at university -- different universities -- Mansoura University, Cairo and others. And then I got an offer from NRCan [National Research Council of Canada] when I was in Egypt, and I accepted the offer. I came back and have been working with NRCan since then.

AD: So where did you do your PhD and what area?

HAMZA: I did my PhD in Northern [England]-- the place was called Newcastle Upon Tyne ....

AD: Okay.

HAMZA: ... and the school changed from King's College to Durham University to Newcastle Upon Tyne University in a very short time. And it was in the Department of Mining Engineering but all my work was on tailings in coal.

AD: Okay.

HAMZA: Coal processing and tailings in coal, yeah.

AD: And so you said that you worked for the National Coal Board in various locations. What was the nature of your work?

HAMZA: My work actually was mainly about improving the environmental aspect of the coal preparation plants, mainly focusing on tailings and so on. They had some problems at those times and this was my study -- to use chemicals and so on to improve the tailings behaviour and tailings performance.

AD: And when you returned to Egypt and you lectured, at the university level did you continue your research?

HAMZA: Yes, yes I did; continued my research and my teaching, so my teaching was a little bit wider than my research. My research was in the area and similar areas of solid/liquid separation and so on, and my teaching was in that and in some other subject, which I considered a hobby since I was studying at university, and this is surveying.

AD: Oh.

HAMZA: So satellite surveying, underground surveying, different kinds of surveying. This was my second -- it was a hobby more or less.

AD: But it also fit in with your interests.

HAMZA: Yeah, absolutely -- but it is different; it's not on the chemical side; it is on more-or-less physical ...



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AD: Physical geography and ...

HAMZA: Yes.

AD: ... yeah.

HAMZA: Yes.

AD: So then what prompted you to come to Canada?

HAMZA: In the first place?

AD: Yeah.

HAMZA: When I came as a post-doctorate?

AD: Yes.

HAMZA: I was first introduced to Canada by some of my friends who came here before me and they said there is great opportunity for doing research. You know, I never intended to come to Canada to live here, but I was looking for doing more research in the areas I'm interested in. So I came and worked with our department as a post-doctorate for two years. I did work, which was a little but unusual from the line of work we were doing before. My supervisor or the manager at the time, he was a Dutch man, his name was Jan Visman, and he was a very dedicated scientist and inventor. And it was very interesting the play between us, you know, because he was focusing on a certain area, which is called large coal mechanical separation, and it was more on the chemical side. I had to convince him at the beginning that the chemical side has a role in this, and he was, as I said, that's why I say he was a great guy, once he's convinced. It was easy afterwards. He was convinced that the chemical side of things is really the way to go, more than I was convinced myself. So that's -- and I worked with him for two years. We had patents with papers and so on, and then I went back to Egypt just going back to my old job.

AD: Yeah.

HAMZA: And he sent me a job offer when I was there.

AD: So were you based in Ottawa then for the post-doc?

HAMZA: No, actually it was all in Edmonton.

AD: Oh, so that you came straight out to Edmonton.

HAMZA: To Edmonton.

AD: And, so you -- and what years was that specifically?



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HAMZA: '71 to '73.

AD: to '73. And when he ...

[*Phone rings.*]

HAMZA: I think I should ...

AD: Yes. You're highly in demand.

[*Pause.*]

AD: So, if you could just repeat that in terms of the period that you ...

HAMZA: Yeah, it was '71 to '73 when I came as a post-doctorate fellow. I went back to Egypt and worked at university as Associate Professor and then Professor. And then I got an offer to come to Canada for a permanent job. And the offer was really very good offer and I liked it when I was working here, so I didn't hesitate to come back.

AD: And, so, when did you come here then to work at the Canmet facility?

HAMZA: Yeah, '75.

AD: '75.

HAMZA: Yes.

AD: Was it Canmet or was it something else at that point?

HAMZA: It -- we changed the names quite a bit. It was called the Coal Research Lab and then becomes the Western -- it was Western Research Lab before ...

AD: Okay.

HAMZA: ... and then it changed two, three times and Canmet -- I would say in the seventies it became Canmet. And you know what Canmet stands for is Canada Centre of Mineral and Energy.

AD: Yes.

HAMZA: ... Technology, yeah.

AD: So were you hired for a specific project or just to undertake research of your choice?

HAMZA: When I came as a PD [post-doc], as a PDF [post-doctoral fellow], as a visiting fellow, it was mainly to do research in the area of coal and, when we get visiting fellows here, we give them a



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choice of two, three areas to work in. And this is the beauty of it, you know, you don't have to follow exactly what's going on and build on it, but you can also look at other areas and follow your interests in there.

AD: So it's an ideal opportunity for a research scientist.

HAMZA: Yes, yes it was.

AD: So then, you know, what did you do?

HAMZA: In what way?

AD: Projects that you oversaw or were involved in once you became a permanent employee.

HAMZA: Actually, most of our work has been based on inventions, which Dr. Visman created himself, and this was called the Visman Cycle, which was very well known all over the world, especially in north, in North America. There was a US company who took a license on that and I think it was called Visman McNally Cycle because of the name of the company, and it was known all over the world. But it was dealing with a problem. When I arrived, I realized that the problem does not greatly exist anymore; so, from my experience, I was working with a different problem in coal. So I introduced that and I started -- so at the beginning there was that thing, you know, what do you know about coal and this and that, and very quickly actually, the work developed in a way that there was an excellent understanding between myself and Dr. Visman that there is a role for fine coal research in Western Canada, and this was the topic at the time, which was of interest to any coal exporting company or country.

So we, at the time, we worked also with other things than coal. In my work, we worked with phosphates with leach things from Sherritt Gordon, (Rinzey?) mines; it's all leaching -- copper, cobalt, nickel and things like that. We worked also on, funny thing, stillage from distilleries and things from breweries -- anything to do with solid/liquid separation.

AD: Okay.

HAMZA: We became very well known in this area. So that's -- it ended up by having -- Dr. Visman used to have a big room with a very large blackboard, which takes the whole side of the room; and we used to go there and he used to divide the blackboard into two pieces, two parts. He gave me half and he take half, and we start working, building on each other's opinions. At the end, maybe in the week, two weeks, a month, we'll come up with new invention. This came very quickly actually after the initial, I would say introduction, but it was actually, you know, getting acquainted with each other's way of thinking. After that it worked extremely, extremely well.

AD: Now, did either of you, or both of you, get involved with any of the coal liquefaction, coal gasification ...



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HAMZA: No.

AD: ... work that was happening at the time?

HAMZA: No. No.

AD: It was still conventional coal ...

HAMZA: Coal cleaning and coal -- coal cleaning; we have a very large export market in Canada for coal, and eastern coals are different than the western coal. Eastern coals are metallurgical coal but have high sulphur. The western coals are thermal coals mainly, but they have a very large proportion of fine particles. So they had problems in being discounted on the world market until we proved that they shouldn't be discounted because these fines don't interfere with their quality and things like that.

AD: So from what I gather from interviewing others with respect to the history of this, the Canmet ENERGY facility that we are in, in Devon, that you were there at the beginning when the federal government decided to enter into an agreement with Alberta.

HAMZA: Yes.

AD: Do you want to talk about that and give me as much information as ...

HAMZA: Yeah.

AD: ... possible and ...

HAMZA: I was actually the federal government representative on the committee for this building. So, at that time, actually, we were at Cloverbar, which is a very small place compared to this, and at Cloverbar we shared the facility with the Alberta Research Council. At the time that Canada decided to give back money they collected for royalty to the province on the condition that it will be spent on projects of mutual interest; and I think it was about 96 million dollars or so. And one of the projects of mutual interest was building a coal research facility, which is this one. And it was built -- the cost was about 22 million dollars for this facility. And it was designed by a committee from the province and university [University of Alberta], so we spent almost year-and-a-half, couple of years, just designing and going through the architecture things, and arguing with each other -- some of us wanted to have more washrooms and more meetings rooms and a track, inside track, and some others say you don't need the washrooms or not too many washrooms; we're not going to do that or meetings rooms; you are going to work, not to meet; and all of these different, diverse opinions until we came to this building, the way it is.

AD: And when did it open?

HAMZA: It opened 1984.



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AD: 1984.

HAMZA: Yes.

AD: And so can you give me a sense of what the building was intended to do? I mean describe the labs, whatever ...

HAMZA: Yeah.

AD: ... any of the special equipment.

HAMZA: Yeah; the building was mainly to do coal and it was divided between two kinds of research. Alberta was very interested -- Alberta Research Council were very interested in coal liquefaction, so this was their part. We were very interested in coal preparation and separation and upgrading the coal itself, working with the coal, coal industry. So the building was built for these two activities. At the time we moved here, it was ourselves, which was NRCan, and it was Alberta Research Council, and we have a company. The company was called CMRC, which is Coal Mining Research Company, and it was supposed to be a private company doing consulting work for different outside organizations, and we had, each one of us had different labs in here.

And then, I don't recall exactly the time, Bruce [Taylor] was looking after the Coal Mining Research Centre, which belongs to NRCan also in Calgary. It was decided to move NRCan here, that lab here. So Bruce moved here managing that lab; and so it was about four different kinds of activities overlapping sometimes; and it was the Coal Mining Research Centre. It was the coal mining lab from NRCan, and it was the ARC Liquefaction and it was the other group, which at the time -- actually before that we called Advanced Separation Research -- AST -- and we were focusing mainly on the fundamentals of separating different things. It was so interesting in a way that, although it was generic, because [there were various] applications; so it was not only focusing on coal.

AD: So here you had this state of the art facility and, then, the market forces decided that coal was no longer a significant export product for Canada, and so you were faced with this state of the art facility and what use you would put it to. So you want to tell me a bit about that story?

HAMZA: Yeah. Actually it was not the market that decided to get out of this; we decided ourselves to get out of it.

AD: Oh, okay.

HAMZA: At the time, we felt that we did everything possible; we held the coal in that way to no end. We used to work with all of them; we developed protocols and programs to do audits. We felt at the time that there is no -- there's nothing more we can do. So, at the time, we used our basic fundamental makeup because that's how we recruited the scientists, how we recruited the people and that's how we got the equipment. The equipment can be used for everything. And we used to joke a lot about that, especially with our female contingent here. From the beginning, actually, we



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were very multi-cultural; we have no problem with gender; we have very high employment of women here, scientists, and from the very beginning it was a very healthy environment. And we used to joke about the fact that we can, if we don't get supported for coal, we'll change this lab to cosmetics. Because we could -- I mean, with the same tools, the same experience, we could work in cosmetics; we could work in pharmaceuticals; work in food sciences. Same fundamental -- it is only different material you're working with. So that's how we, you know, how we survived and how we maintained our expertise, and how we became relevant, despite the fact that things come and go.

AD: Yeah. So then can you tell me what prompted the move into the oil sands area and then the nature of that research?

HAMZA: Okay. Our work was on fine particles -- fine clay particles suspended in liquids. At the very beginning in the oil sands, they had major problems with something called "emulsions," and emulsions are fine dispersants of oil droplets, clay particles and things which are very, very, you could say, "fine"; and they stay stable forever; it's very hard to separate them. So it's very similar to the clay suspension we used to work on in coal. So that's when we became known around that -- this is our area of research -- some oil companies who had started in Fort McMurray -- and we published a couple of papers on emulsions -- they came to us; they say can you look at this problem? So we did that.

We did also some interesting work with nuclear effluence from Eldorado, which was again very fine separation. So we did some work for that. The coal terminals in Vancouver in English Bay were people fishing there for sports fishing find ... that the water is a little bit dirty with coal dust and so on, so it was, it was very interesting because it was a variety of things; and you are using the same tools and same techniques and the same science, science base.

So, once we did that at the very beginning we got a lot of business. We got major consortia to work with us. The first one was Texaco, Petro-Canada, Bayer in Germany for which we developed some chemicals for North Sea extraction, and then we have also Dow US. This was the beginning of group coming together to look at, look at the matches; and they paid for it; they paid fully for what we are doing for them.

AD: So then you had that mixed model where you had Suncor funding from the federal government to build the facility and then funding for operations, but then you also had access to corporate clients, the industry.

HAMZA: Yes, yes. All -- we always had that, always.

AD: So when, what would you say was the first innovation in terms of oil sands?

HAMZA: We worked on a number of projects which contributed to, I will say to the progress of oil sands and that the work we did was with Syncrude to start with, because Syncrude had the research centre, which was one of the best available anywhere. You get some of the best mines sitting there talking to others and we were part of that community. So we did a lot of work with them, actually,



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on reducing the temperature of extraction, which was a big -- they used to work at 80 degrees and lots of chemicals and so on. As a result of this work, they reduced the temperature to 50 degrees and to minimum chemicals, for example.

And then we went into the tailings, which was a big thing and we created -- actually between us and Syncrude we co-founded a tailings consortium, which got everybody -- all universities, provincial, federal, companies [working together]. It was about 5 million dollar a year for five years and, as a result of that, of all this work, we published collectively a book then. This we call *The Silver Bullet*. And actually the cover is a silver colour too, and so was all the names of everybody in it. This was the beginning of research, of collective research on tailings, which was again almost like a breakthrough because every company used to work on their own. Every student or university would work on their own, but this brought everybody together. And we co-founded this with Syncrude and then everybody -- at some time everybody took ownership of it because they got involved with it, and they contributed, and so on. So this was at the beginning; it was things of that nature.

AD: So what timeframe would that have been?

HAMZA: This was actually in the early eighties.

AD: In the early eighties.

HAMZA: Yes.

AD: And so that was the very early days of Syncrude because '75 to '80 was ...

HAMZA: Yeah.

AD: ... when you had the AOSERP, the Environmental Impact Assessment ...

HAMZA: Yes.

AD: ... for the company ...

HAMZA: Yes.

AD: ... so it was right at the beginning.

HAMZA: It was right at the beginning, yeah.

AD: And so that, you know, it would appear that it was not a challenging transition to move from a coal-focus -- research focus -- to an oil sands one. Do you want to comment on that?

HAMZA: Yeah; no, no, it was not at all because that's the intention. That was our intention from the beginning is to build expertise, which is so versatile that we can use it on any -- and so, for a



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spell, a generic that we can use our expertise for a multiple of disciplines, and the problems and so on. And we built also what you call a multi-disciplinary group where we have engineers; we have physical scientists; we have chemists; we have all of those people working together and learning from each other. So, you get a team who are versatile in many things and maybe they are experts in certain areas, but they are knowledgeable enough in other areas to know where to get the information, or who to get to work with them ....

AD: So what would, what would the -- how many researchers would you have had at that period when you were working with Syncrude?

HAMZA: Before coming to this building, we had about maybe 10, 12 people; and when working with Syncrude, it was about maybe 20 people, but we're focussing in these areas.

AD: Now, I've done some research and also interviewed people from Great Canadian Oil Sands/Suncor and, you know, there's a parallelism here. They, of course, had Bechtel and research establishments elsewhere. I mean they didn't have that capacity for troubleshooting and that science establishment accessible to them ...

HAMZA: Yes.

AD: ... whereas there you have Syncrude.

HAMZA: Yes.

AD: It's a very different story.

HAMZA: In a way, because us and Syncrude were, you know, we have a very strong relationship and they have scientists and we have scientists. Scientists talk to each other all the time and so on. But it didn't stop at Syncrude because Suncor was right there all the time.

AD: As well.

HAMZA: Okay, and they were collaborating on projects which are, which want to have the IP [Intellectual Property] as an issue; so that the first consortium was between us and Syncrude as co-founders; immediately Suncor came in ...

AD: Okay.

HAMZA: ... so they were right behind in these areas. So we did work with Suncor on their own; we also did work with Suncor and Syncrude together, and then so on, so it was the kind of thing they were there and then even until now we are working with about -- I will say 10, 12 oil companies -- and sometimes we're working with them as a consortium, and sometimes we're working with them individually to develop technology. And there is technology, which I'll talk to you about which was a major breakthrough in industry, which we worked on. It was a ...



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AD: Do you want to talk about that now, seems natural.

HAMZA: Okay. This is more recent and it was in the early nineties. We worked with Syncrude on the topic of what's called "froth treatment." Froth treatment is a step in the processing of oil sands, and there was technology which was being used by Syncrude and Suncor and, through research, we have done here initially with Syncrude and later Shell, we developed something called Paraffinic Froth Treatment. And it was completely different in concept and in the process itself to the point that you produce a completely different product.

On the regular froth treatment, which is called Naphthenic Froth Treatment, you produce a product at the end which has fewer percentages of oil and of water and solids in the product, which you cannot pipeline as is. You have to upgrade it and, when you upgrade it is major cost and also it creates a lot of problems. This other process, which we developed, as I said, with Syncrude initially, it gives you a product which is completely clean. You have a hard time finding anything in it. So what happened -- and it is less viscous. So what happens, [is] that you can put it in the pipeline with minor amounts of diluent, and you can ship it anywhere. So it gave a complete -- it opened a lot of opportunities for the oil companies. They don't have to have an upgrader on site.

The people who looked at this at the beginning were Shell. Although we developed it with Syncrude, Shell came in and looked at what we are doing. We have a little video -- "Under the microscope." They looked at it; they came here, looked at it, and say "Can we borrow the video?" We give them the video; they went to Holland; they came back and say. "We have a project." In five years working with them, they built a 6.7 billion dollar commercial plant based on the technology we developed there. Yeah.

AD: Which is, is amazing.

HAMZA: Yeah, and in five years. You cannot do this from concept ...

AD: Yeah.

HAMZA: ... to commercial plant ...

AD: Yeah.

HAMZA: ... in that period of time.

AD: It seems to me that the, each of the major oil sands companies benefitted from the technology when they actually began their work, so it ...

HAMZA: Yeah.

AD: ... it was easier for Syncrude than it was for GCOS ...



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HAMZA: Yeah.

AD: ... and of course it was easier for Shell than it was for ...

HAMZA: Yeah, there's always progress ...

AD: Yeah.

HAMZA: ... and they build on each other, so as a result of this invention, we had a consortium, and the consortium started with, again, as usual, us and Syncrude; Suncor joined and [then] came Shell; and now it has almost every company. And, in the consortium, what we did -- every new entrance will come in, the members of the consortium will sit down and evaluate how much would be the entrance fee for this person -- or for this company -- based on the amount of knowledge we generated. So, the latest one was over a million-dollar entrance fee, not to do research for the company but entrance fee to have access to the information.

AD: Okay.

HAMZA: At the beginning, Suncor paid \$250,000 to be a part of this. So, at the end, it was over a million dollars, and it was decided collectively; and we did a lot of research, fundamental research; we're still doing that based on this, and when they want to apply it we have a pilot plant here where they come to us and say, "We want to look at this in that way; we want to have the process flow sheet this way or this way," and we work with them and, when we're finished, we remove everything, come to the basic unit, and then another company will come in. So we have been very busy working actually shifts of 12 hours, so 24-hour run and all fully paid, paid by the companies, and they see a lot of value in it. We have never been -- I don't remember that we been down without work for more than a month at a time, or couple of months at a time.

AD: So you've really become a highly-specialized consulting research company haven't you?

HAMZA: You could say that from that point of view, but we are involved ourselves because we have a government mandate and this is unique. We're not here for profit.

AD: Okay.

HAMZA: Or not here to only help the industry, but our main mandate is to help the country -- to help the taxpayers. That's our mandate. It happens that it coincides with us helping the industry too. So that's the beauty of it. You know, you can get your mandate fulfilled while you're doing something very substantial, if you like, and impact for/with industry.

AD: Well, you know, as the Science and Technology Editor of *The Canadian Encyclopaedia* in the 1980 to '84 period, the buzzword at that time was technology transfer ...

HAMZA: Yes.



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AD: ... from research laboratories, whether at universities or government agencies, to industry. And it sounds to me like this is one of the very successful models for doing this.

HAMZA: Absolutely. Industry is sitting around the table while we're developing things.

AD: Yeah.

HAMZA: And we develop because they sent their people to stay with us here ...

AD: Okay.

HAMZA: ... while we're doing that. So you have no problems with some transfers. They, actually, they are very eager to take it before even it's complete ...

AD: Yeah.

HAMZA: ... and run with it.

AD: Yeah.

HAMZA: So we never had a problem with technology transfer at all.

AD: And it's also a model of a very successful public/private sector partnership.

HAMZA: Yes. Yes.

AD: And so could you articulate -- you talked about your mandate and could you talk about that and, you know, the sense of the founders of this facility and how you interpreted the public good and what ...

HAMZA: Yeah.

AD: ... what you were doing?

HAMZA: We have always been very clear in our department in our mandate and our intent; the intent to work and so on has always been very clear that we're here to help Canada make the most advantage of its resources ...

AD: Okay.

HAMZA: ... and it is permeated down to everybody in the organization. You talk to the technician, tell you that; you talk to the engineer, will tell you that. So we're very clear about our mandate. And we also note our mandate is fulfilled by working with three stakeholders. The first one is the public and we publish in popular magazines. We go and give talks at junior high schools, elementary schools, high schools to tell them what we're doing. We have visits here and open houses and all of



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that. So this is as far as the public goes. As far as the public goes also, we participate in hearings and so on as witnesses.

The second one's policy, okay; in NRCan, we are very particular about having policy informed by science and by facts. So we provide this policy; whenever there is some regulation coming up and so on there is a lot of input from science in, in that.

And the third one is industry, and when we work with industry we want to help them, but not on the expense of the country, okay. So we always try to help them to do the right thing; let me put it this way. So as I said, it's very clear in our minds, has always been very clear, everybody in the organization know that this is our mandate. So that's how we got to where we are, and we have visits actually from -- we have almost twice a month -- we get visits from, say from, the Congress and the US senators, governors, EPA from the European community, from everybody coming here to talk about science and oil sands, because oil sands is very high profile. The negative aspects of this is prevalent everywhere and promoted very, very effectively.

So you have to counter this with some facts and some science and so on; so we have an excellent relationship with Alberta [government] where they invite -- they do a very good job in inviting different groups to educate them -- from all the over the world. When they bring them to Alberta, they take them to Fort McMurray to see the enormous extent of this resource, and they bring them here to see what science we are doing for that. So, the trip is Fort McMurray, Canmet and we don't say federal, provincial; we don't say industry; it is this is where the industry is being performed and this is where the science is being performed.

And it is working very well; it's working very effectively; and people come here and the feedback we get from them and also the questions they start asking afterwards. It's working perfectly and it's not designed on a piece of paper -- you do this; you do that; it just developed on its own by creating that, you could say, mutual trust and how we're dealing with that and they -- [government of] Alberta people at very high level -- sit in with these audiences and they listen to what we are saying; and we don't say anything which is not true. We say anything which we believe in and we say things which, you know, at this moment we are sure that it is this -- we're almost sure that it is or maybe the possibility that [it is] very accurate; and people go away with a positive, you know, understanding.

AD: Now, you know, for example, Syncrude has funded a chair at the University of Alberta. What is the relationship of CanmetENERGY with the senior universities in Alberta -- the U of A and the University of Calgary and, then, the Northern Alberta Institute of Technology and Southern Alberta Institute ...

HAMZA: Yeah.

AD: ... of Technology?

HAMZA: We work with all of them at different degrees. Our relationship, historically, has been very active with University of Alberta. We have co-supervision of students.



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AD: Okay.

HAMZA: We have students doing their PhDs here from University of Alberta. And we are invited to be on their extended committees, advisory committees and all of that. Even at the Dean level, you know, we know the Dean of Engineering extremely well and we collaborate with them at all levels. So our relationship with them has been the strongest. University of Calgary comes second, but mainly in certain areas -- like life cycle analysis and things like that. NAIT and SAIT, we use students from NAIT and SAIT to work here, and also some of the final year projects, they come and do it with our people here from NAIT and SAIT; but, on the research side, but mainly on the teaching side with it. With University of Alberta, it's mainly on the research side. With Calgary it is on the research side.

AD: So it's interesting that you've ended up with an educational function as well.

HAMZA: And it was by intent.

AD: By intent.

HAMZA: For two reasons: from the beginning, we thought that we have an obligation to help young people to come and work here, and learn. The other one is, you know, it's not a surprise but we got fantastic input from them. We learned a lot from them and they injected that energy in here to the point that we spent a lot of budget in hiring students and hiring post-doctorate fellows, and so on, intentionally. But the reward is very, very high. And we get people also from all over the world. We get people from France; from -- the latest one from India, we got two from India; we got three or four from China; we get -- we have here United Nations, if you like. When you go around you will see people from everywhere.

AD: And would you say that that's possible because you are a government agency; an industry lab would be different.

HAMZA: Absolutely; absolutely. The core funding from the government and vision and mandate allowed us to do a lot of things, which are not limited to holding IP to our chest, or saying we are competing with others, or anything like that. We are much more open and the best thing we can do is to develop technology and throw it out there so that people will, companies will use it [as] wide as possible.

AD: Again, in the, in the public good.

HAMZA: In the public interest, in the public -- if there is anything you are doing here in the public interest, we should be doing.

AD: And so that goes back to the foundations of the Mines Branch and Mines and Minerals where ...



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HAMZA: Yes.

AD: ... that was intended to allow Canada to industrialize ...

HAMZA: Yes.

AD: ... and really to become a superpower.

HAMZA: Absolutely; I mean the government is only a catalyst, you know. When things are quiet in certain areas, you go there and initiate some exploration and research, and this and that to get the people's interest; you throw it out there in a quiet pond to create the waves; and this reaches people and they say, "Oh yeah, there may be something there." Many of this work in oil sands started in our department in the early nineteen hundreds, and if you go outside and you go up the stairs you can see some of this history on the walls. We published things in 1927, '26 on clays related to oil sands and so on, which is being talked about right now.

AD: So it's that, that whole research impetus because, you know, I've done some research in the early history of the oil sands and, of course, the Mines Branch actually drilled three wells in the 1890s.

HAMZA: Yeah.

AD: And then, of course, there's the period of Ells [Sidney] and ...

HAMZA: Yes.

AD: ... the competition between the province and the federal government and vice versa. But what you're saying is that, you know, those early years of competition that this has changed with this facility.

HAMZA: Not only with this facility, but with the departments, I would say, focusing on the resources in a more, you could say, encompassing really. For example, I give you example of that. In the eighties, we have a program called Canada-Saskatchewan Heavy Oil Agreement. In CanSask, I was a member of the committee -- we had two people on the federal; two people on the provincial -- and this is a committee to decide on a multi-million dollar program; 50/50 between us and Saskatchewan, between federal NRCan and Saskatchewan Department of Energy to explore in situ recovery. In that program we gave, we funded pilots, pilot plants, pilot projects in Saskatchewan, and this pilot explored -- they explored "what do I hear about now" in technologies in in situ recovery, and we did it on almost a "very equivalent" basis so that we can compare. So we have the fire floods; we have the steam floods; we have the, you know, solvent; we have the coal; we have production; we have the polymer; all of that. And this is what actually started the in situ, the heavy oil activities in Saskatchewan. It was further provincial.



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AD: Now, in terms of the timeframe, help me. You know, in Alberta we had UTF and Roger Butler.

HAMZA: Yes.

AD: What -- was it a parallel time?

HAMZA: It was before that.

AD: It was before that?

HAMZA: Yes, and actually in the UTF ...

AD: Yeah.

HAMZA: ... we participated in the UTF.

AD: In that as well.

HAMZA: Oh yeah. We participated in funding the **ACHOA** program at ARC [Alberta Research Council] at the time.

AD: Okay. Which program?

HAMZA: It's called the **ACHOA** program. It used to be Alberta-Canada Heavy Oil -- I don't recall the name exactly. It still exists, but the second C ...

AD: Yeah.

HAMZA: ... is not Canada, or the first C is not Canada. Now they called the Core ...

AD: Okay.

HAMZA: ... rather than Canada, because we stopped funding this a few years ago. We used to pay about -- our contribution was about \$700,000 a year to support that program at ARC, which is helping them [to determine the] best way to develop in situ technologies.

AD: So basically the federal government -- the provincial government post-1949 got out of oil sands research.

HAMZA: Yeah.

AD: But the federal government appears to have continued ...

HAMZA: Yes.



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AD: ... that, but it was continued in Ottawa and then ...

HAMZA: And then here, here too, and actually what happened is, if you look at the industry interest in research at the early days, wouldn't happen now. The NRCan went up steadily ...

AD: Okay.

HAMZA: ... whether it is a good time or a bad time. That's why we are in the position we are in now ...

AD: Okay.

HAMZA: ... we were steady; we were consistent; and we were -- we knew what to fund and what to focus on; and this actually created credibility for us with the industry. They know that we are doing this not to benefit from them -- we are doing it because we believe that should be done. And, if we believe that any of the areas we're working on now as we felt it was with coal, we cannot do anymore; that's it -- everybody, anybody else can do it, and we'll get out of it and start focusing on something else. Maybe the next one will be fracking; maybe different kinds of in situ; whatever it is.

AD: So, you know, we look at the Alberta Research Council, which was the first research council in Canada, even preceding the National Research Council and, of course, Henry Marshall -- well, Henry Marshall Tory ...

HAMZA: Yeah, yeah.

AD: ... was very influential in creating both research councils, but that the government of Canada has taken seriously and ensured continuity in terms of ...

HAMZA: Yes.

AD: ... the research establishments ...

HAMZA: Yes.

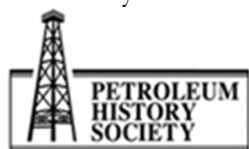
AD: ... that it, that it created this [the National Research Council].

HAMZA: Yes, absolutely.

AD: And that, then, the creation of a regional facility such as this in the eighties, do you think that it was an aspect of western economic diversification, regionalization? What do you think was the motivation?

HAMZA: One of the motivations is that this is where the action is.

AD: Okay.



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HAMZA: You might as well be where the action is rather than being few thousand miles away.

AD: Right, yeah.

HAMZA: And NRCan realized that being a part of the community is very important in creating and maintaining your credibility.

AD: Yeah.

HAMZA: Okay. You are here; you meet with each other; you're friends, after work, before; the visits -- you come and see and you are sitting together in meetings and conferences, and so on. That created a sense of community to the point that sometimes people, even from the industries, are surprised that we're a part of the federal government because we're with them -- we're here and we're a part of what's going on. And what we did, also to emphasize that in the early nineties we moved a very large chunk of our activities from Ottawa to here, and this is on the upgrading program. We created something called NCUT, which is the National Centre for Upgrading Technology, which was federal/provincial. And the federal were NRCan; provincial was the Department of Energy, and ARC participated on it as a performer and partly funded. And it was created here and we still have the labs, and it went for 15 years and then it was discontinued in favour of looking for a new model, which we have -- a new model now.

AD: So, in other words, this facility deals with all aspects, from the extraction whether it's mining or in situ, to then the upgrading, refining new ...

HAMZA: Yeah, very close ...

AD: ... development of new ...

HAMZA: ... very close to final products.

AD: Yeah.

HAMZA: Yes.

AD: Yeah. And also diversifying, if I heard you correctly ...

HAMZA: Yeah.

AD: ... the nature of the products.

HAMZA: Yes.

AD: Now, a major debate and, you know, the whole pipeline and moving upgrading really out of Canada when you're able to transport bitumen in an appropriate and safe state ...



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HAMZA: Yes.

AD: ... then the upgrading can happen anywhere.

HAMZA: Yes.

AD: Do you want to talk a bit about that, because it is a political issue.

HAMZA: Yes. It was actually both good and bad to be able to transport the raw bitumen or partially upgraded (actually it's not really raw) -- from this place to other, other places. It was good because you have -- it was good because you have more markets. It diversifies your market. So now we can ship bitumen to China. Okay. And, if this is what the market needs; and this is on the good side; diversifies; it actually reduces the **GG** and all of that stuff. And the flipside of that is what you mentioned -- was selling raw rather than processing here. But again, processing here, processing it here we have also a lot of debates and ...

AD: Do you want to articulate those?

HAMZA: Yeah, someone sold them -- actually these upgraders and refiners really exist in the Gulf area of the US, and those people are going to get their fees from anywhere in the world -- Venezuela and so on -- so are competing with those on that basis. You cannot say that I'm going to do here -- to do all the upgrading here, and sell it as final products. Those people have upgraders which don't have any, any fee. So you are pricing yourself or getting yourself out of the market because those people are going to look for fees to process and you don't -- you are not providing that.

So, I mean it is a very complex, I will say, economic/environmental/national issues. If you look at some analysis being, I mean you can, can go anywhere you want with this analysis. And I think this deserves a study of different scenarios; and I'm sure it could be done now, or being done now.

AD: The, you know, just to -- one issue is that ... in terms of the building of the industry in Fort McMurray it has challenged the infrastructure ...

HAMZA: Yeah.

AD: ... I mean of Northern Alberta, and they're still playing catch-up with that.

HAMZA: Yes.

AD: The whole notion of another upgrader going up there isn't really feasible ...

HAMZA: Yes.

AD: ... so that, then, the discussion as to whether it should be in BC or Ontario or ...



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HAMZA: Yeah.

AD: ... wherever, Quebec or do you just then export it?

HAMZA: Yes.

AD: It's the whole issue of value-added, isn't it?

HAMZA: It is and actually the balance between all these factors. Okay, and environmental ...

AD: Yeah.

HAMZA: ... policy, public acceptance, license to operate ...

AD: Yeah.

HAMZA: ... social license to operate ...

AD: Yeah.

HAMZA: ... and economics ...

AD: Yeah.

HAMZA: ... and I mean all of this come together; and, as I said, depending on your starting point and your inclination, you can make a case, wherever it is; o that's kind of a situation where it would be very interesting for researchers in policy or in socioeconomic or something to study; very interesting dynamics. But, again, the bottom line is -- does it make any sense economically to start with, because the company has to make money; I mean they cannot just lose money operating a commercial activity -- or a commercial plant or something like that -- it doesn't make sense, so they have to balance all of these things, and then you get the governments and the regulations and the legislations and the politics of energy, which is very high, as you know. So, I mean it has a lot of that -- and that's why it is fascinating and interesting because the subtle factors in it, I think, outnumber the obvious ones.

AD: Now, you know, this is a research establishment that has focused on the use of good science and research to really get rid of problems in the whole exploitation of this bitumen resource.

HAMZA: Yeah.

AD: You know, greater efficiency; greater productivity; better returns on the investment dollar.

HAMZA: Yes.

AD: And, of course, I know that work has also been done in the remediation aspects.



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HAMZA: Yes, we do a lot, a lot of work in that.

AD: And so that's my question to you -- how long has this facility been involved in the whole addressing of environmental concerns, and what are the focuses of this research?

HAMZA: Okay. It is from day one, but let me add one more aspect of what we do before answering this. One aspect we do is to be able to support dispelling the myth, which is out there, about our products.

AD: Yea.

HAMZA: Like dirty.

AD: Dirty oil and ...

HAMZA: Dirty oil ...

AD: ... trying ...

HAMZA: ... okay.

AD: ... reintroducing [the word] tar.

HAMZA: We try to -- by science and fact -- without going there and saying, "We are -- we're coming here to dispel that myth," okay? So, say, we just go and present facts and show results and work with our colleagues in the US and so on to include our information. To come back to answer your question -- we have been working in the remediation side from day one; so it goes hand-in-hand with improving the recovery, or having better ways of upgrading the oil sands. This was, as I mentioned to you, we have the Fine Tailings Consortium, which was very early in the eighties and it had everybody. So, the tailings -- actually we have been working with the tailings and remediation, and the water, and so on from day one, and we have a major activity here on that.

AD: So you want to talk about the tailings research that is happening and any breakthroughs?

HAMZA: And in the tailing research, actually, it has a long history. At the very beginning when Suncor started their tailings pond, they thought that Pond Number One would take care of all their tailings for the life of the mine. They discovered very quickly that they have a lot of clay, and clay does not separate -- fifty to a hundred years still in suspension. So our focus was on trying to break that stability; we worked on changing the properties of the water; adding chemicals; changing the PH and to the point of working with polymers, which they are all working on now. I mean all the industry companies -- industrial companies -- are all working on adding polymers, using centrifuges, which at the very beginning was, it wouldn't be even looked at in any way, but now they are realizing that there are opportunities in there, and we work with them a lot in introducing these new technologies.



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So one of the results of this, of the Fine Tailings Consortium which we started was developing technologies called -- I have to remember the name because -- NST, which is non-segregating tailings ...

AD: Okay.

HAMZA: ... and where you add some sand and some chemicals to the fines, and they all settle. It was developed as a result of all this, this activities by a professor at the University of Alberta.

AD: Mmhm, and who was that?

HAMZA: It was Don Scott.

AD: Okay, Don Scott, yes.

HAMZA: Yeah, Don Scott, and he still comes and visit here, by the way; and we worked with him on that. And then Syncrude and Suncor started, started to use it, and then after that came different kinds of drying -- using plants to suck the water -- and they are trying everything to do that -- skimming the oil; taking the oil off the tailings ponds. Although it is -- it's not really very glamorous if you look at it, but there's a lot of research in it, and there's a lot of innovations in doing that. So now they have a portfolio of technologies available. We participated in a study which the Alberta Government initiated; it was a one million dollar study and it -- there was about six companies [that were] part of that and we got -- I think all the consultants in this field coming, coming together and we ran a study for about maybe a year and a half because, as I said, one million dollar, and all the technologies were evaluated, so many hundreds of them. Even an idea which somebody wrote about in German, whatever it is, all were evaluated with very rigorous criteria.

And they ended up with about 150. So we're looking now at what are we going to do with this 150; once this is done, it will be the most comprehensive look at the tailings -- how to deal with the tailings. So we have that. Again, as I said, centrifuges, using centrifuges. Suncor had -- Syncrude, we worked with Syncrude on using centrifuges; and we went to the field with them; and we ran for a couple of years in the field. We're still doing some work for them here, adding chemicals to the feed to the centrifuge, and looking at the bitumen when it comes out, look at the stability, look at how it breaks, whether it settles properly or not. And so, there's a lot -- although none of them is, you could say, step change in itself but it is a part of that step change in a different direction, but there is a number of these directions. So you cannot really point to one [example]; there's many things.

We use also CO2 in the tailings to settle the tailing and companies are using it now. As I said, you get huge, in my opinion, numbers of alternatives to deal with the tailings, and you wouldn't find one single answer. I think it will be a combination of all -- all these answers.

AD: Now, recently, of course, I read about, you know, once an area is mined out, the notion of actually creating a major lake.



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HAMZA: Yes.

AD: Do you want to talk a bit about that?

HAMZA: This is one of the options, and one of the options is in the end pit, they've called the end pit lake ...

AD: Yeah.

HAMZA: ... or in the mine area, they put the tailings in there, maybe partially treat it or treat it as much as possible, and then, on top of it, you put water and use it as a lake. In my opinion, the final scenario will be -- or the final landscape -- would be a mixture of all of this. It would be a balance of the water and of the wet landscape and dry landscape, and then all of that stuff.

AD: Are -- is Canmet doing any research in that area of the end-pit lakes?

HAMZA: Yeah, we are working with them on ...

AD: The whole.

HAMZA: ... on that whole thing, yeah.

AD: So is there anything else that you would like to share with me before we conclude in terms of ...

HAMZA: No, actually, I -- the main thing is I believe the government and their patient funding have a role in developing the resources of the country. And, over the years, whether it is federal or provincial, it has proven that it is very essential. One example to look at is AOSTRA -- AOSTRA, one of the -- in my opinion -- one of the bright lights in this industry. It created a lot of very high-quality work; supported high-quality research at universities and other areas; and it was a game changer in this area. So we have to understand that -- we have to understand that a government cannot be sitting on the sidelines and looking and saying, "You go and do your best." Government has to be able to be a player in the middle of that guiding and, when industry are doing it on their own, okay, you can -- your guidance will not be as intense, but when it's not done in the early stages and so on, you can be -- you can give the example of what can be done.

And, what the investment, which the different governments get -- if you look at the investment to the size of the industry now -- okay, the leverage is unbelievable; the payback to the public and to Canada and to all provinces, not only Alberta, is enormous and I wish that somebody would do this calculation sometimes.

AD: So what was your budget in the last fiscal year?



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HAMZA: Our budget was in the range of about, you could say, \$20 million -- \$22 million -- something like that.

AD: And how much of that comes from government and how much of it comes from industry?

HAMZA: Industry normally runs about 40 percent of that budget; and the government is ...

AD: So that's really significant.

HAMZA: ... yeah, and we get some from the provincial government and some from the federal government.

AD: Are there any agencies like this out there?

HAMZA: I -- not in Canada -- and I don't know about the world; maybe one in Australia, but not to that extent.

AD: So it's a pretty unique and very special ...

HAMZA: It is; it is ...

AD: ... successful ...

HAMZA: ... it's very, very unique.

AD: ... Canadian model.

HAMZA: It's a very unique model; unfortunately we -- this is normal business to us, so we don't talk about it as unique because we didn't know anything, any other. That's how we work it; that's how it is; and people come from outside, especially from the US, and they say, "Oh, this is really unique," and people here are surprised because that's the normal business, that every-day assumption we have here.

AD: Yeah, so the modesty of Canadians. So do you still keep ties with various universities?

HAMZA: Absolutely. And actually we have a lot of adjunct professors here at different universities around the country ...

AD: Okay.

HAMZA: ... and maybe outside.

AD: Yeah.



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HAMZA: We do a lot of work with the University of Toronto; we used to do work with **maritime universities**, particularly University of Nova Scotia; and Waterloo; and Laval; and so on. I mean this is our -- you could say our normal way of doing business. You have to be in contact with these people because there's a lot of wealth of information, and information is not just going and taking information from them and using it; it is working together that triggers another level of information. It is very exciting.

AD: So the critics who say that, you know, if the research benefits industry, let them pay for it and government get out.

HAMZA: We, we get this all the time.

AD: What would you say?

HAMZA: We get this all the time.

AD: Yeah.

HAMZA: We, the governments are getting their share ...

AD: Yeah.

HAMZA: ... of the benefit from the research by getting the industry to advance, by getting taxes -- the government is getting a lot of taxes; by getting employment; by getting all of that. We cannot say, just say to the industry "You, it is your business since you are big," and they always hear this and always say this is very short-sighted. You know, our presence here and our work in these areas and so on, is helping the country through helping the industry, and it is not just giving them a piece of land and saying, "Come and dig things and go away." You know, you have to be in the middle; that's number one.

Number two, being knowledgeable in this area would help a lot in formulating policies. You cannot go and put -- have a policy which can kill the industry because you don't know. You cannot have a policy which would give away all your rights because you don't know. You have to know your limits, and to know your limits you have to be expert in what you are doing. It is like some of the best department stores. What differentiates them is some of them have very good buyers and some of them don't. These buyers have their hands in the business when they were brought up in that, in that area, and so when they go to buy from outside, they know what to buy. They know it makes sense. They can just make sure that this works because they did it themselves on the bench or on the factory floor, or whatever it is. So even if you want to buy things from outside as government and you have the money, you may be wasting your money because you don't have the good buyers which can help you. You know, it is a very, very interesting concept, but people look at either the balance sheet or look at the very simple concepts and go, "Well, you have big companies, why are we helping them?" And I get it; I get it all the time at all levels.



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[THE INTERVIEW CONCLUDES.]



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