



AMERICAN INSTITUTE OF MINING,
METALLURGICAL, AND PETROLEUM ENGINEERS

ORAL HISTORY PROGRAM

Medhat M. Kamal: A Life in Energy – The Perpetual Impact of Petroleum

PREFACE

The following oral history is the result of recorded interviews with Medhat M. Kamal conducted by Terry Palisch on September 30, 2025. This interview is part of the AIME Oral History Program.

ABSTRACT

Growing up in Egypt, Medhat M. Kamal had a natural curiosity for finding out how things work. Taking apart his toys and putting them back together again as a child led him to Cairo University, where he earned his bachelor's degree in petroleum engineering. He then moved to the United States, earning his MS and PhD from Stanford University. Since then, Kamal has held significant positions at Amoco Production Company, Flopetrol Schlumberger, and ARCO Exploration and Production Company before working for most of his career with Chevron, specializing in well testing, reservoir characterization, and reservoir engineering. Additionally, Kamal is a principal member of the Society of Petroleum Engineers (SPE), where he has served as executive editor for the *Journal of Petroleum Technology* and the *SPE Reservoir Evaluation & Engineering Journal*. He helped form the SPE Stanford Golden Gate student chapter and has served on the boards of directors of the Mid-Continent, Gulf Coast, and Dallas and Golden Gate sections of SPE, as well as being an SPE Distinguished Lecturer, Honorary Member, and the 2023 SPE president. His theme as president, Petroleum++, brought attention to the need for more eco-friendly energy sources and the benefits of industry transition and adaptation. Above all, Kamal thinks that energy is the backbone of society; it is needed to maintain modern life and raise the standard of living everywhere. In other words, it is not going anywhere any time soon.

Readers are asked to bear in mind that they are reading a transcript of the spoken word, rather than written prose. The following transcript has been reviewed, edited, and approved by the narrator.

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00:00:11 Introduction

Palisch:

Well, good afternoon, everyone. Today is September 30th, 2025, and I have the distinct honor to interview Med (Medhat M.) Kamal, the 2023 SPE president and Chevron Emeritus Fellow, where he was most recently the manager of the Dynamic Reservoir Characterization Group. Med has had a long and distinguished career in our industry, making significant contributions not only to our profession, but also the Society of Petroleum Engineers, or SPE.

Med and I have actually known each other for over 30 years, having first met back in the late 1980s when we both worked at ARCO Oil and Gas, and of course, most recently, serving together on the SPE Board of Directors, where I followed him as president. My name is Terry Palisch, and this recording is a part of AIME's Oral History Capture Program.

Welcome, Med. It's great to talk to you.

Kamal:

Thank you, Terry. I want to start by saying thank you to AIME and SPE for allowing me the opportunity to talk a little bit about what I've been doing. And I want to thank you, Terry, for conducting the discussion that we're having this afternoon.

00:01:02 How My Childhood in Egypt Turned Me into an Engineer

Palisch:

Thank you, Med. The pleasure is certainly all mine. How about if we start at the beginning? Maybe tell us a little bit about where you grew up, maybe about your childhood, maybe what did your parents do for a living?

Kamal:

Thank you. I was born in Egypt, where, of course, I grew up there. My father was a lawyer, and he worked for the Justice Department of the Egyptian government. So they transferred him just about every other year to a different city. So I grew up all over Egypt, from the far north to the far south. One of the points I say about that is I always hear people talk about, this is my childhood friend, we grew up together all the time. I don't have that because every other year, I was in a new school, in a new city. Completely different situation.

We stayed moving from city to city throughout my entire time growing up. And I only settled in one place when I started college at Cairo University. My mom was a homemaker, and I am one of seven children. I'm the second one from the top. So, we would just have a normal Egyptian family growing up, except just moving from city to city every other year.

Palisch:

Interesting. Wow, so your dad was a lawyer, and your mom was a homemaker. So then what influenced

you to become an engineer, and maybe even what caused you to go into the field of petroleum engineering?

Kamal:

Actually, there are a couple of things that made me an engineer. Number one, I've always been intrigued with how things work and why do they work that way. The reason I'm saying that is because I remember one of my uncles; he went and complained to my mother that this kid, every time I give him a toy, he does not play with it. He opens it up and tries to find out how it works. So I had that curiosity to find out how things work.

And the other thing is that I don't like memorizing stuff, and I found that in the math classes, I don't have to memorize stuff. In the exam, they gave me a problem, and I solved it. Whereas, for example, in the class of history, I have to memorize when did Napoleon Bonaparte invade Egypt, which year, and all that stuff. I don't like memorizing stuff. So, it was easier for me to actually be in science or engineering than to be in some other thing. This is how I started getting into being a petroleum engineer. You also may ask me about why petroleum engineering?

Palisch:

Yes.

Kamal:

Reading and learning, while I was growing up, I found out that one of the things about the ancient Egyptians is that they were [among] the first people who ever used petroleum. They used tar in mummifying bodies. This is the first known use of petroleum in the history of mankind. So that got me interested in that subject, that product that actually dates back to a long time ago, from the ancient Egyptian times.

So that got me thinking about petroleum engineering. I started reading a little bit about it when I was still in my last two years in high school. And pretty much, I made up my mind that that is what I'm going to be studying when I go to college.

Palisch:

I did not know that about the Egyptians. That is interesting. So your history actually caused you to go to petroleum engineering, but your history also is what caused you to be an engineer.

00:05:50 From Cairo to Stanford – Making the Move to the United States

Palisch:

You mentioned it earlier—Cairo University—but I know you've gone to other universities besides Cairo, so tell us a little bit about university. Why did you go to the universities you went to, and where did you go?

Kamal:

The way you go to university in Egypt is a little bit different than the way you go to university in places like the United States. The way it works is that in the senior year of high school, there is a general exam. Every student in the final year in high school takes that exam. We all take the same exam throughout the whole country. And then based on that, you have your final grade, which is the sum of all the grades you get in all the different subjects. And then after that, you apply to universities, and you start going with the people with the highest grades. You have the choice. The higher your grade, you have the choice to choose where to go to school.

When I was growing up, that was a time when there was a lot of need for engineers in Egypt. The people with the highest grades, these are the ones who went to the School of Engineering. Of course, Cairo University is the oldest non-religious university in Egypt. So that one took the highest grade. For example, during this time, if you cannot make it to engineering school, you settle down, and you go to medical school.

So, I studied, and I was fortunate enough to have enough grades to allow me to go to whichever school I wanted to. And this is how I joined Cairo University. And as I mentioned, I always wanted to study petroleum engineering, so that's how I started going to Cairo University.

You also mentioned that I went to another university. That's correct. So, upon graduation from university at that time, there was a large need for engineers in Egypt. And when you graduate from university as an engineer, you pretty much didn't have a choice to where to go to work. There is a presidential decree that would say you have to go to work in this place. And in my case, the presidential decree was that you have to be a member of the faculty of the School of Engineering at Cairo University, which was fine. Actually, that's what I wanted to do.

And when you go there, you start as—we really don't have anything like that in the United States or Europe. It's a position that is kind of like what we call “teaching assistant,” but it is not really a teaching assistant. [It's starting tenure-track faculty position that leads to the positions of assistant professor, then associate professor, and so on.] In order to continue to that, once you're on tenure track, you must have obtained a master's degree within five years and a PhD within seven years.

And I started working on getting my master's degree, and I got a master's degree actually from Cairo University, and the rules were that you must have one examiner of the people who are going to examine your thesis to be an external examiner. And based on the work that I was doing, I selected Professor Frank Miller, who was the chairman of the department at Stanford University, to be my external examiner. So, he [was] the one who reviewed my thesis, and said, yeah, okay, yeah, that's good enough, we can give him a master's degree.

But also, what had helped, though, is that he actually became very familiar with my work, and there was a scholarship given by Marathon Oil Company going to Stanford at that time in order to study what Marathon used to call Mara Flood, which is an enhanced oil recovery process that uses surfactants to push oil towards a producing well and polymer fluids to push the surfactants, the surfactants are usually micellar fluids. And when I applied to universities to get my PhD, Professor Miller said, yeah, we can use this person. So actually, I think that was kind of a lucky break on my part.

So this is how I ended up getting a scholarship at Stanford University, because at that time, the situation in Egypt was that you were not allowed to take any money with you outside of the country. You must

have all your expenses paid for by wherever you're going because there was a crunch on the budget.

Palisch:

Right.

Kamal:

The project was a project that was given by Marathon Oil Company, and it was actually given to Professor Hank (Henry) Ramey, who was one of the professors at Stanford. But Professor Ramey, as probably most of the people in petroleum engineering know, his main area of interest is in the area of pressure transient testing. The person who was actually doing the work in the area of flooding and experimental work was Professor Sullivan (Sully) Marsden, so he was my first advisor at Stanford. And Professor Ramey used to say that I'm one of the luckiest people in the United States because I have two bosses: my academic boss and my financial boss. So this is how I started going to Stanford University.

00:11:55 College Projects and Lessons Learned – My Mentors at Cairo and Stanford

Palisch:

Well, go Cardinal. So, as you think back, whether at Cairo or Stanford, Med, were there any professors that you kind of felt were your mentors or that mentored you in some particular way?

Kamal:

I was actually lucky enough that I had a lot of mentoring or advice given to me by a lot of professors. I'm going to start by one example. When I was doing my senior project as a senior student at Cairo University, we were the class of petroleum engineering. We were 45 students, and the senior project was to optimize water flooding for an oil field in the Sinai Peninsula that was called Belayiem Field, and that field was actually managed by ENI, the Italian company. Each one of the students was given an injection rate to use in their work. And the idea was that by the end of the project, we are going to cover the entire range of injection rates, because each student will work with one rate.

And then you'll be able to figure out which one is the optimum one. I need to remind everybody, these were the days before we had all this fantastic computer programming that we have right now. [There] were 45 students in the class. My number was 34, so the rate assigned to me was towards the high end of the range of rates. And I finished my work very quickly, and I found that the injection rate assigned to me is actually way too low. So my professors, and in addition to the advisor from ENI, figured out that we need to increase the rate that was given to every student.

So I was complaining to my professor that now I finished the work, and now you're going to give me another rate, so I have to do it again. So he looked at me, and he said, okay, so now you have a rate that's lower than anybody's rate. You can have your old rate, [but] it may be a good idea if you add another one higher than anybody's rate, and this way you envelop everybody else. Can you do that?

He actually told me, you know, don't complain, use the opportunity to do that. I learned that lesson. That's a very, very important lesson. That actually was Professor Taher El Hadidi, who was the chairman of the Department of Petroleum Engineering at Cairo University.

Another mentor that I learned a lot from was Professor Ramey at Stanford. As I mentioned, I was going there, and I was working on my scholarship project. I was working on the Mara Flood, where I was running experiments using polymers to push micellar fluids that were used to push oil towards producing wells. That model was lucite. You need to be able to see it. So you get that lucite [in] large sheets, and you have to cut them into model size, [and] you're actually going to glue together the model. So I tried to do that, and the department itself did not have a table saw that you can cut the thing in there. Professor Ramey said, you know what, I have a table saw at my house, so why don't you plan to come on the weekend? I'll take you, and we'll go to my house, and we will cut your model.

And then that morning, he called me, and he said, you know what? It's raining at my house. So we're not going to do that. What you need to do is just let me know what you want, and I'll come back when it's not raining, and I'm going to take the lucite there, and I'm going to bring my son with me, and we're going to go ahead and do that.

And for the rest of my project, whenever I wanted anything done, I would just leave a note on Professor Ramey's desk. I want this done. And he would come, he would do the thing, he would work on it, and he would deliver it to my office. It's one of the main lessons I learned; your job as a manager or your job as a professor is actually to make sure that the people that are reporting to you have the chance to do their work right. That is your job. Your job is not to tell them what to do. So that's another example of these things. I was lucky to have, as I mentioned, enough people who are actually able to guide me through these things, and I continue to learn from them all the time.

00:17:14 A Lifetime in Internships – The Early Work Experience That Shaped My Career

Palisch:

Wow, that's really interesting, Med. So, did you have a chance to do any internships then, whether it was at Cairo or at Stanford?

Kamal:

Yes, when I was at Cairo University, during my sophomore year, I interned with Shell. They have a field in the Sinai Peninsula, it's called Sodr, and I actually spent the summer working with them in the field there. I spent all [my] time on the rig site, and I worked on the rig floor. I actually worked several shifts as a monkey man. So it was very extremely important education. Back then, we had learned drilling in the classroom, but actually, when you're in the field, and you find out how things work, not everything you calculate gets done the way you calculate it because it is different.

I interned when I was in my sophomore year. Now in my junior year, I was lucky enough I did an internship with Kuwait Oil Company in Kuwait. And again, that was one of the ways I learned a whole lot. Because, as everybody knows, in Kuwait and this part of the world, the reservoirs are extremely permeable, and flow rates are extremely high. And I remember that one of the things, one of the jobs—I wasn't actually doing the job, I was just helping the engineer because I was just a student. We were actually fracturing the well that was making 20,000 barrels a day.

Palisch:

Oh my gosh. Wow.

Kamal:

We were fracturing it. That was on the north side of Kuwait. So I learned a lot about the thing.

Now, when I went to Stanford, in my first year, I got an internship with Pan American Oil Company, which later got to be known as Amoco Oil Company. I got my internship in Lafayette, Louisiana. I spent the whole summer there, actually spent most of the summer in the Gulf offshore on the first floor on sitting platforms doing a lot of logging, and somehow, they liked what I was doing, so they said, okay, you can come back in the next summer. So, from that point on, whenever I had some time off, I went to work for the summer. For the summer, I knew to work for them. I wasn't going anymore after that to Lafayette, but I was working in their office in Denver, and even they told me, during the Christmas break, Christmas holiday, show up. I used to show up for two weeks, get one paycheck. And that was, of course, very important for a student. Everybody knows that.

So by the time I finished all my work at Stanford, I had accumulated enough working time with Amoco that I was eligible to get a vacation.

Palisch:

Wow.

Kamal:

I already had one year, so I was able to get a vacation. And that was one of the main reasons I decided to start my work with Amoco.

Palisch:

Well, that's great. I mean, you did a lifetime just in your internships. I mean, Sinai, Kuwait, the Gulf of Mexico, and then Denver. That's awesome. So, Med, it sounds like your first job then was with Amoco. Is that correct?

Kamal:

Yes.

Palisch:

And would you remember what was your first major project when you were at Amoco after graduation?

Kamal:

Yes, at the time when I graduated, that was a time when enhanced oil recovery got to be at the forefront of our challenges that we had as petroleum engineers. Amoco was working on a micellar flood in Sloss Field, which is in Nebraska. And one of the important things, of course, we want to do is that we need to have a more detailed characterization of the reservoir. Because we all recognize that we have a

lot of challenges with micellar fluid and polymer, and you can imagine now this is an extension of what I was doing experimental work [on] at Stanford. So we wanted to actually have a better characterization of the reservoir.

After I started doing experimental work at Stanford for my PhD, I actually shifted and went to the area of transient well testing, and I did my PhD on pulse testing. So I volunteered by saying, if we really want to have a very detailed description for that pilot that we are doing, the Sloss [micellar] Pilot, then we actually need to do pulse testing among all the wells in order to figure out exactly if these wells are connecting with each other or not. So I was getting the chance, yeah, go ahead and do that. So I went to the field, which is, by the way, one of the things that helped me a whole lot. And it actually became one of the points I always tell people, especially the young engineers: find a way to go to the field. Whatever it is, find an excuse to go to the field. You learn a whole lot.

So I went there to the Sloss Field, and I did the testing. It was only a 10-acre pilot, that's it. And it was chosen because it was supposed to be homogeneous. It was supposed to be all the wells, the four injectors, the own producer, all of them to be in communication with each other. Simple stuff.

But when I actually did the pulse testing, I found that that's not the case. These wells are not in communication with each other at all. Some of them are not. We published papers on that later on, and it became one of the things that opened everybody's eyes. But from that point on, [for] all the enhanced oil recovery projects that Amoco did, whether it was in the Rocky Mountains or in West Texas, we did extensive pulse testing on all of them, and that became one of the major things that took a lot of my time. So that was very nice work, very interesting work, and very educational as well.

00:24:26 My Greatest Mentors and Their Wise Words to Live By

Palisch:

Yes. Wow. So, as you think back of those early days, Med, was there anybody who stands out as a mentor again or someone who influenced you in your career as you were getting started?

Kamal:

Yes, a lot of people. One more time, I really think I'm lucky that I have that many people work with me and teach me. One of the people who influenced me a lot is the late Howard Hall. I'm sure everybody is aware of the Hall Plot. Howard actually did that work when he was doing his master's student work at the University of Tulsa. Howard had had his bachelor's work at Oklahoma State University. But he was my first industry boss at Amoco. Whenever he gave me an assignment, the way he would sit me down, more important than telling me what he wants me to do, he [would] always tell me how important it is for me to do that and how important it is for the company to do that. All the time, [he] gave me the feeling that I'm actually doing the most important thing for the company. Without me, the company is not going to work. But that was a very educational point.

One of the things [that] continued after that, after I graduated, and now I'm going to meetings, and I'm attending conferences and things like that, I met Professor Ramey one time at one of the SPE conferences, and he told me, are you going to go listen to this paper? And I said, no, I already know the subject of that paper. And he told me, even if you think you know the subject of the paper, if you're smart enough and you listen, you're going to learn something new. And that paper was being presented

by Professor Raj (Rajagopal S.) Raghavan at the University of Tulsa.

Palisch:

Wow.

Kamal:

He was still a young assistant professor at the time. And sure enough, you learn a lot from doing that. It doesn't matter if you think you're knowledgeable enough that you know the subject. If you listen to somebody else talk, you are going to learn something technically, and that will help you. So as I mentioned, I got a lot of mentoring and help from a lot of good people.

Palisch:

Yes, those are wise words to live by for sure.

00:27:24 Reflections on My Career Progression – Big Moves, Big Changes

Palisch:

So you started at Amoco, and then just take us through the rest of your career progression, Med—who you worked for, maybe where you worked if there were different locations.

Kamal:

Yes, so I started working at Amoco, and the research center is in Tulsa, Oklahoma, which is a beautiful city. It's just a mid-sized city. And then I got married, and my wife is a physician, and she wanted to continue to pursue her career. Tulsa, as I mentioned, is a medium, mid-sized city, so there [wasn't] enough work for her, [and] we figured that we really needed to go to a bigger place. At that time, some very good friends, very good, smart people, at Flopetrol Johnston, which was a company of Schlumberger, they were talking to me about, you've done enough work for an oil company, maybe you can come work with us and see the experience. And, of course, because we wanted to move to a bigger city, Houston, so I accepted that work, and I went, and I spent some time with Flopetrol Johnston and Schlumberger. And I found out that I'm not very comfortable working for a service company.

Of course, we know that service companies, such as oil companies, universities, and government, they are all integral parts of our industry, and they are all very important, and they are all doing an excellent job, and Schlumberger was a good example of that. It's just [that] I was more comfortable working for an oil company than for a service company. And this is maybe because when I first graduated from school, this is [who] I started working with. So I figured that I better work for an oil company again. Schlumberger people were extremely nice to me. We didn't have any difficulty, anything like that.

But then, of course, we had to go to a big city. So at that time, we went to the Dallas area, and I started working at the research center of ARCO (Atlantic Richfield Company). This is when you and I started crossing paths in our work. And I continued to work with ARCO. That's another very, very good company. I had what I consider good fortune to work on some of the best, largest oil fields in the Western Hemisphere—Kuparuk, Prudhoe Bay, and so on. And I actually enjoyed going to Alaska a lot. So

I continued to work with ARCO until the year 2000, when ARCO merged with British Petroleum. And at that time, one of the things tugging [at] me [was] I really wanted to go somehow back to California; when I first came to the United States, I went to Stanford. So that was an opportunity for me. I moved to Chevron in the year 2000, and I started working with Chevron until now. I retired about three or four years ago, but I'm still working with them as an emeritus fellow. So I'm still working with them.

One more time, [it was] a very good experience with Chevron after ARCO, after Schlumberger, after Amoco, which was after Cairo University, where I learned that I really don't enjoy teaching that much. So it actually cemented my belief that our industry is really full of very excellent people. Because everywhere I work, I found a lot of support. I found a lot of people who have valued your work.

Our industry is not very large in numbers, as we all know. For example, the Society of Petroleum Engineers, all of us, are less than 140,000 worldwide. So you end up finding that you know a lot of people, you work with them in different projects, different capacities all the time, and you find that for the major part, it's very collaborative, exciting work. It's an excellent industry.

Palisch:

Yes, for sure.

00:32:38 What Makes Us Unique – The Biggest Challenges I've Enjoyed in Industry

Palisch:

So, Med, you've touched on a little bit of some of the research and some of the work you've done, and you've certainly had a lot of different experiences and things. If I asked you to brag just a little bit here, tell me what you consider some of your largest contributions to our industry. I know what I would think of them, but I'd like to hear from you. What do you consider some of your best work, and how do you feel like you really made contributions, whether it's research or work, or what have you?

Kamal:

Most petroleum engineers know that what is very exciting about our work is that we work with systems that we did not design. These systems are given to us, and we have to figure out what they are. And for that, we are similar to our friends, the mining engineers. We also are similar to the people who do meteorology because both of them work with systems that are given to them. But in their cases, both of them, they actually can see their system, they can touch their system. We don't. So our biggest challenge is to characterize our system. And that is what I found to be the most interesting part—this is where I did most of my work—is reservoir characterization. And in order to do that, we actually have to use all different types of things, whether it's geologic description, the information that we get from seismic, what we get from static measurements like logging, what we do from dynamic testing, or what we [get] from the data that we obtain from the production history of the wells. So, [it's] an integration of all the information you get from all these things in order to be able to characterize the reservoir and be able to finally get a model that will allow you to predict the performance of the reservoir under different conditions and different scenarios. So we actually go ahead and find out how the project works. That is the main part, which I think that I made my biggest contribution to the industry.

A lot of my research is about how do we use data from different groups, different sites, in order to

characterize the reservoir and figure out what's the best way to go forward, what are the best projects—do we go with water flooding, do we go with tertiary recovery, is it important for us to fracture big fractures everywhere like we did in our history? So all the things result from the fact that we need to characterize the reservoir first. It's challenging, and it's actually very exciting work.

Palisch:

Yes. You hit the nail as far as what I would have said at ARCO. I mean, I just remember being in Alaska, and how many times did we say, well, we have a well test question, and we have a characterization question. Let's call up Med Kamal. He'll help us out. So I definitely remember that.

So, what do you consider then, Med, what were some of your biggest technical challenges that you experienced?

Kamal:

The biggest technical challenge that we have in our industry is that we have a lot of data. We are actually swimming in data. But this data comes in different shapes, different forms, and they don't measure exactly the same thing. And then our thing is that we need to put all this data together in order to find out what the system that we're working with is. And once we started working with a given production system, like stimulating the well or fracturing the well, or like we're going to go with water flooding, then we have the data that continues to come at us, and we need to continue to work with that in order to figure out what is the best way to go to the next step. So the data that we have, we have a lot of data, especially now that we have, for example, downhole pressure gauges everywhere. When we do any logging of a well, or we do any fracturing of a well, we have a lot of data that's coming to us. So all this data comes in different groups, and you need to synchronize them, make them work with each other, and we need to recognize which part of the data each one is telling us.

And here is a very specific example. I remember when I was working at Amoco—and one more time, I really was lucky working with some of the smartest people in the field. So I was working with Dr. Mike Smith and Dr. Ken Nolte, and they would go ahead and fracture a well, and they come back and they say, we fractured that well, and we created a fracture that is 500 feet long. And I go ahead and test the well, and I said, no, it's only 100 feet.

It's the same fracture. Their numbers are correct, and my number is correct. They actually cracked 500 feet in the reservoir, but only the 100 feet next to the well that's actually contributing. The other 400 are still sitting there, but whether they are there or not, that's not going to change the performance of the well. So that is a good example of how we're calling them the same. We're calling the fracture length, but it's not the same number.

So being able to understand the different information, all the different pieces of technology we're using, giving us, in order to put them all together and manage our field, that is a challenge. But to be honest with you, it's fun. When you figure it out, and you say, oh, now I know what that thing is, that's fun.

Palisch:

Well, it goes back to your point earlier that just one of the beauties I've always thought of our profession is we've never seen upfront and close what we're working with. And so it's always up for interpretation,

and it's up for debate. And that's what we do as engineers.

So, Med—

Kamal:

THIS IS WHY WE ARE UNIQUE.

Palisch:

Yes, I agree with that. Exactly. Exactly. And by the way, that's why we're always right.

00:39:37 Petroleum++ and My Work as 2023 SPE President

Palisch:

So, Med, you were, of course, the 2023 SPE president. You had a theme of Petroleum++. I know that was a very near and dear to you endeavor. So, tell us a little bit about that theme and why you thought that was important.

Kamal:

Yes, that team came from the fact that we are having a lot of discussion about energy, the different types of energy that the world needs. And there are different groups that talk about projections about where are we going to use energy from. One of these groups are the major international companies like ExxonMobil, like Chevron. And one other group are the group like government entities, like in the United States, we have the Energy Information Administration, or in Europe, they have the International Energy Agency. And then they have a third group, which are made mainly of the national companies like Aramco, Petrobras, and Petronas.

All of these groups actually talk about where are we going to get the energy from. We all agree to start with that we will be needing more energy than what we have today. Two main reasons. Number one is that the number of people living on the planet right now are eight billion. By the year 2050, there will be 10 billion people, so we need 25% more energy. And then, of course, the increase in the standard of living everywhere. So we need more energy. Where does this energy come from? And all these three groups that I mentioned, they come out with projections, and they vary a little bit, but they are all similar. And they all talk about how we will be needing hydrocarbons, specifically oil and gas, for a long time to come.

Meanwhile, we need to be making sure that energy that we are producing does not harm the environment. When we talk about maybe needing to find energy, we need to be cognizant of our effect on the environment. The third part with that is that all the energy that we're going to be producing from oil and gas is not going to be enough. We need more energy from other sources as well. So, the main point that comes to mind [is] that we will be needing to produce oil and gas for the foreseeable future. I know that the latest projections, for example, from British Petroleum that showed up maybe about two weeks ago, talks about that the need for oil is going to continue to increase at least until 2045 or something. And that may go to plateau after that. Same thing for natural gas. This is just one example, but all of [the other projections] are similar to that. So we will continue to produce oil and gas, and in

order to produce oil and gas with a larger quantity. Although the percentage of the share of the oil and gas in the energy mix, the percentage may decrease a little bit, but the total volume is going to increase. In order to do that, we will be needing to do more development of what we are doing today. The technology and the work that we're doing is not enough.

So that's one thing. [That is why the word Petroleum is in the theme.] And the other part is that we don't live in a vacuum, and of course, we all need to keep this planet for ourselves [and the following generations.] So we need to be very cognizant about we need to do things the best possible way in order to reduce any harm to [the] environment. This is the first Plus. The first Plus is making sure that we don't harm the environment and actually do everything as clean as possible. And the second Plus is that there are additional forms of energy that we're producing. And petroleum engineers actually have a very important role to play in producing these additional [forms] of energy. Like for example, when we talk about geothermal, and when we talk about Hydrogen these are additional forms of energy that actually it's us, petroleum engineers, who are able to produce it. [This is the second plus.]

And for the part about protecting the environment, the first Plus, we have a lot of work to do on that. One of them, for example, is to make sure that our operations do not add as much as possible [of] greenhouse gases to the environment. Our operations are the ones that are being able to capture CO2 and keep it under the ground for a long time. Because right now, this is still the most viable way of reducing carbon dioxide in the atmosphere.

And then we also have added to the part about the energy we're doing. The amount of energy needed is actually now increasing a whole lot more as we start talking about artificial intelligence and the amount of projects that we do [for] that, and some of the work that some of us are doing right now is we say, okay, maybe what we need to do is that we need to have our energy production areas very close to the data management facilities, these huge facilities, these huge data hubs that companies like Microsoft and Google and Amazon are all talking about building. Maybe we need to have our facilities very close to them in order to be able to immediately deliver the energy to them.

There are some talks in the industry about using nuclear energy for that, and it is feasible, but there is also a lot of work that will be done through natural gas, where we're actually going to be able to have our gathering facilities very close to the people using the power. So this is where the Petroleum++ came from. It actually says that as petroleum engineers, especially as a society of petroleum engineers, we are going to continue to be responsible for producing more oil and gas, we're going to be responsible for mitigating any climate issues because we are an integral part of that world, and we are going to be working on additional forms of energy as well. So our role is expanding, and as some of my fellows, petroleum engineers, know from the things I write and discuss, I really like the term "energy expansion" because in my opinion it's more descriptive to what we're looking at than the term "energy transition."

Palisch:

Yes. Well, I know your theme was a really good jumping-off point for me. So it set a really nice stage.

00:47:00 My Awards and Recognition – A Very Humbling Experience

Palisch:

So, Med, I know you've received many awards and honors over your career, both at your companies, but

also at SPE. Would you care to tell us what some of those awards are, and maybe ones that were the most meaningful to you?

Kamal:

Sure. The first award I got was the Cedric K. Ferguson Medal, which is an award that's given to the best paper published by a young professional under the age—when I was there—it was under the age of 33. Now it moved up to under the age of 35. But when I was there, it [was] people under the age of 33. So that was the first award that I got, and it actually made me more appreciative to SPE more than I already have been because it gives an idea [that] they actually do value your work. They actually have a system by trying to do vetting and [properly evaluating] things. And I continued working with the society because I really like it.

As I mentioned, from the beginning, from the days I was in high school, I was passionate about petroleum engineering. So as a result of that, I got [an] additional award. Like, for example, I got the Formation Evaluation Award, which is an international award. I worked a lot with the society; I reviewed papers, I worked as the executive editor of JPT (*Journal of Petroleum Technology*), and SPE REE (*Reservoir Evaluation & Engineering*). I worked on the board of directors of local sections that I lived in, whether it was in Houston, or in Dallas, or in Tulsa, or the Golden Gate next to San Francisco. So I got regional awards for that, for the service award, which, of course, I appreciate that.

And then, after all the work, after all the years, I was lucky enough to be nominated to be an honorary member of SPE. And that kind of like crowns the achievement, and actually, one more time, makes you humble. [It] makes you really recognize that yes, you continue to do the work because that work is actually going to be recognized—and one more time—in my opinion, by all these good people that we have in our own industry. Each one of these awards made me more eager to do more work and [made] me humble. This is for the society.

On the employment part, being selected as a fellow of Chevron and being selected as an advisor before that, when I was working with ARCO, that was, again, these are technical recognitions. Fellows at Chevron are people who are actually doing technical work that does two things. Number one, it adds to the bottom line of the company. That's important. And then it also must have a visible help for the industry as a whole. So internal and external. So, one more time, these are humbling recognitions that I will always value.

00:51:00 Reflections on Family and Finding a Work-Life Balance

Palisch:

Yes. So, I do want to talk more about SPE, but before we do that, Med, awards and honors, a distinguished career—none of that stuff happens without your family support and things like that. Tell us just a little bit about your family and what was the impact, maybe good and bad, of your work on family life, and then how did they support you?

Kamal:

I was lucky enough to have a lot of good mentors and good people from the industry. And actually, I would say that I'm luckier even for my spouse. I mentioned at the beginning that because when I got

married, we wanted to move from Tulsa to a bigger city for my wife to pursue her career, which of course she did, but she was all very supportive for all the work that I was doing— our work, not only for SPE but also our work for a company. Petroleum engineers, the drilling rigs, work 24 hours, seven days a week. One of the things that I always say [is] that, and it's true, wells like to be cased, fractured, logged, or tested on major holidays, somehow.

Palisch:

And at Midnight.

Kamal:

So there is a whole lot of time where I actually have to spend major holidays at the rig site. And my wife was accepting of that. She knows what I was doing. Of course, I was spending all the time I need with my family as well. There is one example I want to say. So, it's two o'clock in the morning, the phone rings. I pick up the phone, and one of my good friends at ARCO, John Vogel, he started asking the question. He didn't say, I am sorry I'm waking you up. He didn't say when are you going to get up. He started asking the question, we have this data, what do they mean? And when are you going to be able to show up? That time, we were talking about a discovery that ARCO has done, and on a slope—the Kuvlum discovery. So my wife [was] like, what is that? I said, no, this is work. So that's fine with her. She was always extremely very supportive.

And I'm also, by the way, very supportive for her. So she moved with me as we moved across. And I have two children, a daughter and a son. I'm blessed to have both of them. But I also, in addition to my work, actually did all my work with them. I grew up in Egypt, where there is only one sport people play there. Unlike the United States, where people play football, baseball, basketball, or hockey, in Egypt, there's only one sport: soccer. So I grew up doing that. So when my kids were growing up, I was a coach of their soccer teams. I enjoyed the experience. That taught me a whole lot. And I actually was very helpful to be a part of them. But as my job took me away from them, and whether it's a day job or volunteer work, they all have been very supportive, and I'm just simply lucky to have them.

Palisch:

Yes, that's excellent.

00:54:46 How I Ended Up in SPE & The Infinite Benefits of Member Societies

Palisch:

So, Med, let's go back to the society discussion. I think you alluded to this a little bit earlier, but when did you first hear about SPE, and maybe how did your SPE involvement progress over the years?

Kamal:

Sure, so I actually heard about SPE by chance. One more time, I was an undergraduate student at Cairo University, and I'm working on my project, and I am looking at all the different publications that are available to you. And I have a whole lot of respect for publications like *Oil & Gas Journal* and *World Oil*. But then there was this publication called *Journal of Petroleum Technology*, and so I was looking at all

the publications, and the *Journal of Petroleum Technology* really have a special meaning for it. Their papers are a little bit more in-depth; they're a little bit more technical. I really want to have a subscription to that.

You cannot have a subscription to that. You need to be a member of SPE to have a subscription to that. And as I mentioned earlier in our discussion, we're not allowed to take any money out of Egypt. There is no such thing that you can spend money to be a member of the society. So I couldn't be a member of SPE. I couldn't get copies of JPT. So it's one of the main things that I have in my mind that as soon as I go to the United States, I'm going to be a member of SPE, so I can get JPT.

Palisch:

Wow.

Kamal:

And that is true. I keep on telling the story. I actually arrived in the United States on September 18th, and on September 20th, I submitted my application to SPE just because I wanted to have access to JPT. And it became a very rewarding experience.

First of all, you learn a whole lot from the publication, you learn a lot from attending meetings. When I was a student, one of the first things that we used to do is that there was a monthly meeting of the Golden Gate section, which was in San Francisco. Just one more time, [I want to] show people how lucky we are. So every time there was a meeting for SPE, our professors, they would bring their family cars, which used to be station wagons at the time, not SUVs like these days. They load them up with students and drive us to San Francisco—[which] was actually a very important learning experience—to where you actually go there and you meet all these people.

And I remember all the professionals, professional engineers, whether working from Chevron at that time—which, by the way, was called the Standard of California, it wasn't called Chevron at that time—or Standard of Ohio, which was at that time, how they treated us, how they worked with us, how they [introduced] us as students to the members. And then you learn a whole lot from attending meetings like that.

Then, as I started learning, okay, maybe I can work with the society, I found out that there is such a thing as the student chapters. With two of my colleagues, we actually established the Stanford Golden Gate student chapter. And I know that I tease all my friends from University of Texas when I tell them that the Stanford chapter, student chapter, is older than the University of Texas student chapter. Look it up. Of course, both of them are excellent places. I have to say that my daughter graduated from there, the University of Texas, so I better be nice.

And then I found out, as you volunteer and work with the section, you learn a whole lot. The networking, the interaction, when you're sitting in the meeting, and you're looking at the different projects other members of the section are working on, you learn from them. One of the things that people sometimes don't think about is when you write papers for SPE, you learn a lot, because you write the paper, the paper gets reviewed, the reviewers actually start asking you questions that make you sometimes think about, oh, maybe I better check that out. And you actually learn more by writing the paper than you may think. I thought about that. And of course, I did my work also as a volunteer, as a

review chairman, and then an associate editor and executive editor for both JPT and SPE REE.

In addition, I worked on the sections of Tulsa, the Gulf Coast, Dallas, and the Golden Gate section. I was lucky enough that I was able to actually serve as the chair for both the Dallas section and the Golden Gate section. And of course, as a result of that, I served on the International Board of Directors. You really learn a lot about the society, all the work that's being done, and the intricacies of all the things that we are doing.

Right now, we are having a discussion about what is the best way to manage our society based on the challenges that we have. I see, for example, that last column that's written by our current president, Olivier Houzé, have a whole lot of discussion in it. And I find that the discussion that exists right now on the management part of SPE was [provided] by our next president, Dr. Jennifer L. Miskimins. So [if you] work with people, you learn more about the industry, learn about the challenge that we have, and that will actually make you appreciate more and more the work that we've done, and kind of invite you to contribute to the thing. So being a member of SPE, being an active member of SPE, is definitely—you benefit more [when] you put the work in.

Palisch:

So, Med, would you care to be specific on maybe a couple of things that you think being a member of SPE has benefited you specifically in your career?

Kamal:

Yes. Number one, the main thing is the technical knowledge. The technical knowledge that you get from all the publications that have been done, from attending all the seminars, that is number one. Number two, the networking. The networking that you will have with meeting members from all different types or parts of the industry. As I mentioned before, our numbers are not very large. You actually end up knowing a very large number of people, and that will be helpful. In my opinion, you can pick up the phone and call a friend in the other part of the world and ask a technical question, of course, if we're all smart enough and we all diverge in our trademark information or co-proprietary information. However, you can learn a whole lot from that. So it is enriching your technical knowledge from publications, seminars, and networking. Also, you're having fun learning, working with some, and meeting some very dedicated people.

01:03:04 The Importance of Energy – How to Attract Young Engineers to Industry

Palisch:

Yes, it's interesting you say that. My next question was going to be what you would tell a new graduate, but I think you just told me that. That's kind of the benefits of being in SPE. But let's just say this, speaking of young members and new graduates and young professionals, as you know, even when you were president of SPE, we continue to talk about kind of our challenges with attracting young people, not just SPE, but maybe to our industry.

Maybe give us some thoughts on your opinion on what we can do, whether it's SPE or as an industry, to help attract more young people into our industry.

Kamal:

Of course, in order to attract more people to our industry, that requires work from all of us. And the main point is to continue to try to explain why we matter and that we are going to be an important part of the energy solution for a long time to come, and the contribution that we are doing to every place we work.

For example, look at where Guyana's work are now, based on the work that ExxonMobil is doing after the discovery that they had in the recent years. Look at the advantages that different parts of the countries of the world are benefiting from having the oil industry as part of them, and how they are actually moving the standard of living of these countries. We're not talking about only salaries, we're talking about work that we're doing with schools, hospitals, and so on.

But it is important also that we need to be supporting our young professionals and students by providing them with this information. One of the things we can do is that we can develop materials, lectures, but lectures need to be developed by people who can actually know how to reach students at universities—maybe not us petroleum engineers, who are more technical in thinking rather than human interaction—where we actually be able to present them, for them to recognize that you are studying to be in a field that is very important to the well-being of mankind. The standard of living that we live in does not exist without energy.

This is needed. This energy is needed in the different forms, and one more time, the Petroleum++, and all the three phases of it. And it needed to be done, and we need young people to do that. And we will be needing to do more technology as the technology is going to advance. One of the main things about our society, the Society of Petroleum Engineers, and our industry, is that we recognize the value of continuous development, continuous improvement.

The first fracturing job that was done used 49 gallons of fluid. Forty-nine gallons. Now we're talking about what we use today and how it changed, for example, when we went to the era of massive hydraulic fracturing in the middle of the 80s and all the technologies that we need to develop to do that. And now how we use that technology in order to be able to produce new forms of energy from tight formation, shale formation.

We are actually creating reservoir-type rock from source-type rock. So this is continuous development, this continuous technical development that's happening, and it's going to continue to happen. We can also talk about the advancement in drilling—how far we can drill, the pressures that we are working under. I apologize, for I don't remember which CEO of one of the oil companies talked about [how] the pressure we encounter right now in some of our deep-water wells is like if an elephant is standing on top of a dime, which is, by the way, correct. That's a correct analogy. It's a correct number. I hope he calculated it right, but I think he calculated it right.

So we will continue to develop. We are doing a whole lot of development in our industry by using things like data analytics, we're using machine learning, and we're using artificial intelligence. We are doing a lot of development in these areas right now and require a knowledge of petroleum engineering, in addition to the knowledge of the so-called “technology” area. But we are doing that work right now. We are developing artificial intelligence work. We are doing that. Of course, we are smart enough [that] we're doing that in collaboration with some of the companies that have people specializing in that. And we're going to continue to do that.

So the technical development of our field is going to continue to expand, like it has been done before. And we can actually give the example, prove to you over the last 100 years, look at what we've been doing. And now we're going to continue to be doing that. We need the energy in petroleum engineering. We're going to continue to [do] development, whether it is in the petroleum engineering traditional areas or the additional areas like machine learning, artificial intelligence, and data analytics, and so on. So we need you. The world needs you. And you are actually going to have a very important part to play in the life of people worldwide.

Palisch:

Yes, it's hard sometimes for us to explain just some of the cool things that we're doing—the things I think that would surprise a lot of young people. So I agree.

01:09:39 Summing Up My Career – Advice from My Past and Hopes for the Future

Palisch:

So, Med, just a few questions about, as you kind of look back on your career as a whole, thinking back, what would you say working in this field has been particularly meaningful to you, or maybe what has been your favorite part of being in the industry?

Kamal:

As I think of my career, the first thing I do is I'm really thankful to God for blessing me to be able to do the work that I was doing in this industry. I also find it was a very exciting career because of all the challenges that we have, technical challenges, in addition to some other challenges that we have, for example, by being able to work in different cultures all over the world, which is a challenge, but also it's eye-opening for us. So this is very exciting work all the time. And in addition to that, it's fulfilling. At the end of the day, you recognize that you are doing something that is actually very beneficial to all people on the planet.

Palisch:

Yes, well said. Let me ask you this question. This is always a fun question I get sometimes as president. If you go back and talk to young Med, maybe it's high school Med, college Med, or university Med, is there anything you would tell that person to do differently, or maybe to encourage them to do, or what would be your message?

Kamal:

The main message is that you need to keep in mind that, number one, try to work on something that you like to do, you're passionate about. Find the area that you are passionate about that actually makes you feel good working on it. This way, when you get up in the morning, go to work, you're not going to work; you're going to do something you like. And that is a very important. Find out what are you passionate about and try to pursue that.

Number two is that there is no substitute for hard work. You need to work, because after all, this is why

we are on this planet. We need to work in order to help yourself, help your family, help your community, and help everybody else in the world. So there is no substitute for hard work. So, as I mentioned, you may as well be working on something that you're passionate about.

And then the third thing is that you need to recognize that you are never going to stop learning. [There's] always going to be developments, always going to be changes happening, and you need to continue to learn and keep updated about all the areas that you're working on for you to be able to continue to do your work at a level that will actually end up being helpful to everybody around you. It really doesn't matter what you work in, as long as you give it your best. If you work on something you're passionate about and you give it your best, you are going to find that you are going to be fulfilled, you're going to be happy, you are going to actually be enjoying life. And that is, after all, what we're all looking for.

Palisch:

Yes, there's no substitute for hard work, is there?

So let's have a quick little bit of fun here, Med. Looking back on your career, how would you sum it up in, say, two or three words? What would be two or three words that you think would kind of sum up your career?

Kamal:

I would say that I am blessed, I'm excited, and I have an exciting career, and fulfilling career.

Palisch:

Nice. So "blessed," "excited," and "fulfilled." That's great.

Well, Med, I guess before we close, I'll just offer up to you, is there anything else you'd like to discuss? Anything we didn't cover? I know we covered a lot of things, but anything else you'd like to leave everybody with?

Kamal:

I would say that number one, we need to recognize the foresight of the people that we are working with. It actually starts with the AIME, the American Institute of Mining Engineers, where more than 100 years ago, they had the foresight to recognize that there is this new energy thing called oil that we need to embrace, and we need to have it as part of our work. And this is why petroleum engineering became part of AIME. So, looking forward and recognizing what is happening is very important. And we need to be thankful for AIME for all that work that they've done before we became—we're still part of AIME, but SPE now is its own part since 1957.

And then the other thing which is very important for us to recognize is that although we started as American, AIME, American, we recognized very clearly that this industry is not American, it's worldwide. And this is why we became an international society of petroleum engineers. And we have right now more of our members outside the United States than inside the United States.

And we are going to continue to be looking at the future. And as I mentioned before, energy is going to be needed, is going to be diversified, going to be different forms of energy. We will continue to be doing the development of the technology, and we will be developing that technology in the additional forms of energy that lends itself directly to our work, in order for us because we are needed to be an important part of the energy equation.

So keep the foresight of the people that came before us and how they look to the future, and we need to learn from that, and we'll continue to do that as we build and plan for the future of our technical societies, as well as our industry.

Palisch:

Well, that's a great sum up, Med. I appreciate the comments. You know, I have to say this has been a fascinating time for me. I've known you for a long time, but getting to know you better, your career, and your life story has been very inspirational. So, congratulations on that inspirational journey.

I just want to say again, thank you so much for being willing to share your story with AIME. It's been a distinct privilege that you chose me to interview you and spend this time, and also to get to work with you over the years. So I just want to wish you all the best and continued success in the future.

Kamal:

Thank you, Terry, and thanks to SPE and AIME for allowing me to share my thoughts with the other members.