BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT

Interviewee:	Charles "Chuck" Enze
Date:	June 26, 2009
Place:	Dallas, Texas
Interviewer:	Jason Theriot
Ethnographic preface:	Charles "Chuck" Enze grew up in South Dakota, where he attended the South Dakota School of Mines and Technology, graduating in 1975 as a civil engineer. Enze took on with Shell Oil at the start of 1976, eager to work on offshore platform designs for the Gulf of Mexico. In 1977 he was tapped to assist the design and construction team for the Cognac deepwater platform. After stints with Shell in Houston; California; and on the North Slope of Alaska working on Shell's offshore efforts in the Chukchi Sea, Enze returned to the Gulf of Mexico as Shell ramped up its efforts in the nascent deepwater basin. From 1987 to 2006, Enze served in a number of capacities for Shell in deepwater, from overseeing the development of the Auger tension-leg platform from construction to its installation in the early 1990s, to overseeing the work of multiple Shell business groups from 2000 until his retirement six years later.

Begin File 1

JT: This is an interview with Chuck Enze in Dallas, Texas, on the twenty-sixth of June, 2009. I'm Jason Theriot. We're in the Lincoln Plaza talking about his experience in Shell deepwater.

Tell me where you're from, a little bit about growing, your academic training, and your experience with Shell.

CE: I was born and raised in Aberdeen, in the northeast corner of South Dakota, near the border with North Dakota. It's primarily an agricultural area, lots of farming. Aberdeen is a relatively small town, just about twenty thousand people. I had a normal upper Midwestern upbringing. I wasn't very worldly at all, I just thought that was the world, and I had the usual typical Midwestern upbringing.

I finished high school, started college, and didn't know where to go. My parents had never gone to college. In fact, my father didn't even graduate from high school, he grew up in the Depression era. I was one of five children. I was born towards the tail end; my older brothers and sisters were pre-World War II, and I was one of the last ones. My parents were quite a bit older and had gone through the Depression. They basically were hard workers and stayed there, but I didn't really want to do that and I started college in my hometown attending Northern State College, which primarily produced teachers.

I enjoyed math and that was my major was initially, but after a couple years I fortuitously decided that I wanted to go into civil engineering. I didn't really know what civil engineering was, but nevertheless I got accepted at the South Dakota School of Mines and Technology out in Rapid City, South Dakota, in the southwest corner near Mt. Rushmore, went out there and graduated in December of '75.

I'd been fortunate to have three different summer jobs working for different industries within engineering and had a mentor that had guided me through all that. My last job was in the summer of '75. It was in New Orleans with Texaco, that's where I got exposed to the offshore industry in the Gulf of Mexico, so that sparked some interest. That fall I interviewed with Shell Oil.

JT: What year was that?

CE: That was in the fall of 1975. Right after the first of the year in mid-January, 1976, I decided to go to work for Shell Oil. I chose to go with Shell Oil because they were an industry leader. I didn't know a lot. There was Exxon, there was Shell, there was Texaco, and there were others, but Shell had what appeared to be a good reputation and was stepping up very actively in the Gulf of Mexico.

I was a civil engineer with an emphasis in structural engineering. They were doing a lot of platform design, and they tended to do their own design and then follow through on the management of the construction project, while some of the other ones tended to contract that out the design piece. I really wanted to do design work, that's why I went in that direction.

As I started off I went through the usual training where you get introduced to fieldwork in the company. At least in those days with Shell, most all the engineers went through a phase of what they call petrophysical engineering. I did that in the Gulf of Mexico and spent a little over a half a year of doing that. You're literally bounced around from platform to platform and you get an opportunity to really learn the whole scope of the upstream oil and gas business, you're involved with the drilling of wells and logging of wells and petrophysical logging. You're seeing what's going on and you're learning how to take care of yourself as you go from platform to platform. In those days you ran lots of workboats, some helicopters, and you had to deal with roughnecks and tool pushers. As a young college graduate, I kind of got pushed around a little bit, but that was just part of the growing-up process.

After that, I went through the rest of the training with Shell. I spent close to the entire first year in various kinds training and exposure. Then I was assigned to a civil engineering group based in New Orleans, and my duties there included supporting the ongoing operations and whatever they needed to expand platforms, check out loadings. That was in case they needed to send additional packages up there or move a work-over rig on there. Or in case they needed to expand and add a wing deck onto the topsides and do geotechnical work, do soil points, determine whether you could move a jacket rig into a particular area so that it wouldn't sink.

I literally thought I was going to end up doing that for a couple years or so but it was actually just a few months, and then I got lucky. I didn't have much time with the company, but I got tapped to be a field engineer. I'll call it field, but that's not what they called it. I was actually a civil engineer working in the construction group on Cognac. I worked under Dan Godfrey, who headed up the construction of the platform, and he reported to Pete Casbarian, who was the project manager. Dan Godfrey headed up the construction, he had a small cadre of engineers that reported to him, and I was one of them. I know you interviewed Gordon Sterling. Gordon headed up the installation work.

I was assigned to oversee the top section of the Cognac platform, the construction as well as the structural element of the deck. Those were my two areas of primary responsibility. Of course, I was fairly young, so I thought I had a lot of responsibility, and I did, but I had a lot of guidance and coaching from Dan and others who had more experience, and we had a very experienced group of other construction foremen and inspectors.

But I got really exposed to working with the various contractors, primarily McDermott at that time, and what it actually took to build things and how to work with people. Actually, how do you work with people is very important. We had a lot of negotiating going on, and I was in there preparing estimates all the time. It was almost like a T&M-type job because the design was going on while we were building it, and it was a fast-track project. We didn't call it fast-track back then, but that's what it was.

JT: What explains that? Was it such a big discovery?

CE: I'll plead a little bit of ignorance, because in those days I didn't know what FID – [final investment decision] or the sanctioning of the project actually was, what drove it, what were the basic business drivers. Schedule was one, and I think part of it was that they had a development plan that they had submitted to the MMS, and the development plan always had timelines, and you had certain milestones you had to meet. Usually the MMS did not dictate what those milestones and exactly what the timing was, but for business reasons, Shell wanted to get the development and the revenue generated, so they wanted to move on it fairly fast. At that time I think the general feeling was taking existing technology but greatly expanding on how you design and build for jumping from 300-and-some feet to 1000 feet of water. I think development was driven for that reason; that they needed to get the revenue going as soon as possible.

JT: I guess during the seventies, with the energy crisis, there were some concerns to get things moving.

CE: Yeah. And I'll admit, as I said earlier; I came from South Dakota, I was not worldly, I did not know. I knew there was an energy crisis going on, but at the time I was putting myself through college. I had no income generated from my parents or anybody else. My head was down in the books. I wanted to just graduate as high as I could in my class and to get a job and do well and get out. I did not fully understand what was driving the oil industry, seriously, for quite some time. Even when I started with Shell, I just wanted to learn, so I kept my head down, I did my work. I didn't fully know exactly why Cognac was driven the way it was. I know a little bit more now, but I'm trying to put it in the perspective what I knew back then.

JT: So you were twenty-six, -seven, -eight?

CE: No, I was about twenty-four.

JT: Really?

CE: Yeah. I was born in '53; I was assigned to it in '77. I was twenty-four years of age.

JT: Was Shell at the time known for doing taking really young guys out of college and kind of throwing them in there?

CE: Well, that was one of the reasons why I went with Shell, because they gave you lots of responsibility. They didn't put you out there and expose you totally; they had some very experienced individuals that supervised you. I mentioned Dan Godfrey. He wasn't all that old, but to me he was pretty experienced. Then there was Gordon Sterling. There were also a number of other key individuals throughout who were related to the designing and construction and installation of that platform. There were seasoned individuals all the way up and down; I specially remember a very seasoned individual by the name of Norris Dodge. I'd be surprised if they haven't mention his name already. He headed up the overall installation of Cognac and worked very closely with Gordon Sterling. He had a lot of history with them. He and others believed in challenging the younger engineers, giving them some rope, but not quite enough to hang themselves with. That was one of the things I'd heard about Shell is that they were going to let you handle a great deal of responsibility, and that's one of the reasons why I decided to go with them.

My first real exposure into major projects was on Cognac, and I enjoyed that a great deal. After Cognac was completely and successfully installed and placed into service, I was transferred into the main Civil Engineering Offshore Platform Design Group over at Head Office Civil Engineering in Houston. That was the group that was perceived within Shell, and we like to think within the entire industry, as the leader for its capabilities and expertise on designing and staying in the forefront of the offshore industry.

JT: Was that at Bellaire?

CE: No, it was downtown Houston. The Research Group was closely connected to that group, because we depended and worked side by side with the R&D Group out at Bellaire Research Center, BRC. That was headed by Pat Dunn; he's another individual that would be good for you to talk to. He headed up that group, starting in mid-seventies probably, and held that position for many years. In fact, I was the one who replaced him when he retired in '93.

To be assigned to work for Head Office Civil Engineering was considered a feather in your cap if you were, let's say, a civil engineer or a marine engineer or a naval architectural engineer or a geotechnical engineer. That was where you wanted to go, that was the group you eventually wanted to get into. I worked in that group until mid-1982 doing platform design; I designed a number of platforms and followed them through construction and installation. All of them were shallow-water platforms, as shallow as 40 feet of water depth, because we did a lot of things along the Gulf coast towards the border of Texas and Louisiana

in those days. There was quite a bit of development over there, some natural gas, and we did a lot of that. We threw a lot of them together. I had two or three platforms that I designed that were about 300 feet of water as well.

But in mid-82, I was transferred and asked to oversee the construction of a platform for the West Coast called Eureka off of Huntington Beach. That was located in just over 700 feet of water on a very steep sloping of the Continental Shelf, so even the bottom of the platform was very steeply sloped. I think I was tapped to head that project primarily because, well, I had some design experience, but I wasn't designing the platform. It was really managing the construction of it, and a lot of that came from my field experience on Cognac. As a design engineer, you interacted with the fabricators, and so I was tapped to head up that group out there. I went out on the West Coast to manage that. The main contractor was Kaiser Steel.

JT: So that's where you were going every day, to check in with those guys and make sure the construction was going as expected.

CE: Yeah, we had construction going on three sites along the West Coast, all under Kaiser Steel, a major contract. Kaiser Steel was located in Napa, California, on the Napa River, and they had a large API pipe mill there. They also had fabrication facilities there and they did a lot of the pre-construction work for the structural members, conductor guides, and all that. They would put it on the barge on the Napa River and float it down the river to the northern part of the Bay Area in Vallejo, across from Mare Island Naval Shipyard, which was a nuclear sub shipyard, and they had a fabrication assembly yard right there. You could almost look right downtown. It was a hill from downtown; there are some great pictures of the water. Our 700-foot platform just stood out. It was the skyline for the city right on the bay. That was the second.

They had another. They had their steel manufacturing facilities in Fontana, near Disneyland, and that's where they produced the steel plate that was used for all the structural members. They produced it there, brought it on up, rolled it in Napa, produced all the structural members, prefabbed things, took them down and we assembled it out there, and then we took it out.

To make a long story short, I had a very interesting tow arrangement, which I had responsibility to take all the way down to the site. Then I handed it over to another peer of mine who was responsible for the actual launching, setting, driving the pile, and setting it up off of Huntington Beach. However, I still had responsibility of getting it out of the Bay Area.

It wouldn't fit under a number of three obstacles. One was the large power lines that went across to the naval base, which was the easiest to solve. The second one was another bridge in the northern part of the bay, which when we loaded it all on

the barge, we had to leave it hanging off. We didn't load it all the way onto the barge; we had to submerge part of the barge and part of the jacket into the water. But because we were not in open seas, that was okay. We cleared that bridge, and it just had five feet of clearance underneath that barge bridge.

JT: Was that was all anticipated?

CE: Yeah, it was all planned. Then the last one was going under the Golden Gate Bridge, and for that one we were only going to have roughly five feet of clearance as well. That one didn't quite go as well as we had hoped. We were to go underneath that bridge right around the Fourth of July, but they started resurfacing the Golden Gate Bridge. It's the first time they resurfaced the Golden Gate Bridge since it was first constructed, and they had overlooked that as they took off some asphalt of the surface, on one span, that it would change the shape of the bridge overall. So where it was high in one spot, now it's lower, and where they'd taken the weight off on the outer span, it had gone up. Center span had dropped some, and we had less clearance. In fact, we were trapped.

We discovered that for the Texas [California?] Department of Transportation. We were doing surveys up there. We were allowed to do surveys because we wanted to make certain that we didn't create an incident out there that would be dangerous. We discovered that this bridge isn't shaped like it's supposed to be, and we contacted Texas [California] Department of Transportation, and sure enough, they verified it. Then they had an issue because the *U.S.S. Intrepid* was already in the Bay Area, and it relied on that same clearance and determined that it couldn't get out if it needed to, with its conning tower and antennas and communication towers up as high as they had them. The real problem was really the communication towers. They had to lower them and take them down so the vessel could go out underneath the Golden Gate Bridge.

I know we're supposed to concentrate on the Gulf of Mexico, but that was an interesting project and we did come out of that very successfully. It was a very good project, finished on schedule and within budget, and we had a lot of good experiences there with Kaiser Steel and a number of the engineers. Kaiser got involved with Bullwinkle as a result of that.

JT: Kaiser did?

CE: Yes.

JT: Was that the first deepwater project off of California?

CE: I would say if you want to call it deepwater, it was their second one because Exxon had one prior to that. I think it was about the same water depth, maybe a little bit deeper. It wasn't 1000 feet of water. I think it was Lena.

JT: The tower?

CE: Yeah. I think Lena was the name of the other platform. That was a long time ago. I used to know that, but I don't remember.

I was done in the West Coast by '84, and then I transferred back to New Orleans to work in the Gulf of Mexico. That had been a 700-foot water depth platform, and they had a discovery called Boxer which was in roughly 700 feet of water, and they wanted to move fast on that one. They wanted to get it going because they also had another discovery about the same time called Bullwinkle.

They wanted to get these going but didn't want to congest the fabrication that was ongoing there. We ended up negotiating Boxer instead of having a full design. The engineer who had designed Eureka and then had worked for me out on the West Coast went into Head Office Civil Engineering, that's when he did the design on Boxer while I negotiated it. He and I worked hand in hand because we had a good feel for what we thought this platform was going to look like. I negotiated the costs and schedule of contracts for Boxer, and at the same time I was involved with a group of individuals that were doing the early planning for Bullwinkle.

We did the early planning for Bullwinkle, awarded Boxer, and they started off construction. Gordon Sterling was brought in to be involved as a project manager on those two projects.

JT: Was Boxer a McDermott job?

CE: Boxer was McDermott's, that's who we had negotiated with. McDermott was one of the premier fabricators at that time, and they got pretty busy with Boxer.

I don't know when we bid out Bullwinkle. It was a kind of different challenge; it was deeper than Cognac but it was going to be one piece and we needed the time to progress the design, mature it up, to really understand what it was going to look like.

I spent a lot of time on the contracting strategy. That was all those early planning stages, and we decided we were going to go through a two-phase process, which I presume Gordon went through and described. That is kind of typical these days, but back then it was not a typical route. We started out with a larger list of companies to see what their capabilities were. It was really to see who was capable, not so much to get a cost or define schedule, but to see how they would build it, what were their capabilities, what was their capacity, how they would approach it, what were the risks and how they would deal with them, those kind of things, and them they shortlisted them.

Of course, there weren't many that could do it, and that's when kind of a unique arrangement came together called Bullwinkle Contractor or Bullwinkle Constructors. They named it after the platform, and it involved some former McDermott individuals some people from Peter Kiewit.

JT: From the Corpus area?

CE: Well, at that time they weren't in Corpus. Peter Kiewit was not down there. They needed people who understood construction, and they pulled them in. There were a few good Kaiser lead individuals that had worked on Eureka. Kaiser had fallen into financial troubles by that time, and they were going out of business. These individuals were no longer going to be there.

There were guys like Tommy Joe [phonetic]. He and about three or four other key individuals were strong field engineers who really knew construction and how to pull that together. They were brought in by this group of individuals, not as the senior guys, but actually to lead a lot of the work going on in the field as well as detail planning. So essentially it was a group of individuals that they pulled together and created this company. First, of course, they had to acquire access to property, which was a key piece of it, but then you need people to plan how you were going to erect this thing, how you were going to build it, and how you were going to do it efficiently.

One of the key individuals was Myron Rodrigue, who had been a former McDermott person, his name's probably come up.

JT: I spoke to him last week.

CE: Myron and I go way back. When I was on Cognac I was on the top section, Myron was my counterpart who was responsible for McDermott. Myron and I have remained business friends and personal friends since 1977. To this day, we talk to one another if not every month, it will be about every two weeks, and we still see one another. He's semi-retired now, but still messing around a little bit with Kiewit.

JT: I'm scheduling to go and fly down to Corpus to visit with him.

CE: Yeah, you'll enjoy talking to Myron.

JT: Is he originally from South Louisiana?

CE: Yes, he is. He's got a nice camp down there. Ask him about his camp. I've been down there a lot. I'll be down there at the end of July with him and his wife.

JT: Where is this camp?

CE: It's in the Atchafalaya Basin, actually not too far from the old McDermott yard in New Iberia.

JT: I'm from New Iberia.

CE: Oh, you're from New Iberia.

JT: Yes.

CE: My wife's from Lafayette.

JT: Oh, really?

CE: Yeah.

JT: I'll be.

CE: Her brother has lived in New Iberia for many years. Their last name is Fore. Her father was a dean of agriculture at USL for many years, Dean Fore. You'll enjoy talking to Myron, especially if you're from down in that area. See if you can get invited to go down to his camp down there. It's on a barge. It's quite a camp, it's not your typical camp at all.

Anyway, those were beginnings of Bullwinkle. As for myself then, once they started in construction of Boxer and Bullwinkle, I didn't see those through. We had an opportunity that Shell Oil wanted to pursue in the Beaufort Sea off the North Slope of Alaska, so I was assigned to work on that. I went to head that project up, that was in early '86. And, gee, just within less than two months, I moved my family and everything, we got ready to go. We just moved over to Houston, because that's where we were going to do the base planning for that project.

JT: From New Orleans?

CE: Yeah, I moved from New Orleans again.

JT: You went New Orleans, Houston, New Orleans, back and forth.

CE: Yeah, California and all those places. We moved around a lot. So I moved over to there and was working in the Alaska Division, and the reason that I didn't go up there is because once we got the project going, we were going to have to build it. It wasn't going to be built in Alaska. There aren't enough yards up there. We thought were most likely to build it in Japan. There was a slight chance that it

would be built in the West Coast, but there wasn't much out there, which meant that it was more likely to get built in the Far East someplace. So, we were just waiting to see where that would take place.

But the oil industry went through another one of these really bad downturns in early '86, so it didn't look like it was going to sustain. You needed high near-term future-looking prices to make a project like that go, so we backed off of that one very quickly. But at that time, Shell Oil was also looking where to go next. The general view was: Is the Gulf of Mexico playing out in the conventional water depths that we were working at? Where are we going to go? What are we going to do to sustain ourselves?

JT: The Gulf of Mexico was considered a dead sea by many.

CE: That's right. Of course, now this is '86, and I've been with the company for ten years, but I'm still fairly young. I was not involved in the strategy but I generally knew the results, and that was to say that we needed to roll the dice in a couple places where we think geologically. It wasn't water depth; it was the geology. In fact, that's something you really should explore, not just go after the platforms and the water depth, but what drove us into deepwater, and I'll come to that in a few minutes.

We decided as a company from a strategy at the very senior levels that they needed to pursue a couple of potentially large opportunities. One was the deepwater, and it was a potential type of geology that might exist out there that they didn't know it existed, and they had no idea whether it was going to be productive or not.

Then the other was the Chukchi Sea, which is off the northwest of Alaska and bordered at that time with the Soviet Union boundary. There was a lease coming up, and Shell wanted to determine very quickly whether we wanted to play into that lease or not. To determine that they had to do some subsurface work, and even if they had discovered oil up there they needed to know if they could build anything to survive in that environment, because it was actually perceived to be worse than the Beaufort Sea, and figure out how they would actually even get the oil out of there.

I led five studies on what the platforms would look like if you put them out there. One study was about the environment that they would have to survive under. For that we did a lot of mineralogical and ice studies. The other one was on how the platforms would look like. Another one was actually on how to transport the crude out. Then there was the issue of how to run the base operations. I had some people from bulk drilling and producing operations, so we studied how their daily operations would go, how they actually would be able to function with that

whole platform. Would it have to be fully enclosed? How would we do the safety?

JT: Did you have any examples to follow? Was there anyone else up there doing similar kind of work?

CE: No, there was nobody else. We had the North Slope, which was onshore, and then we had the North Sea, which is not ice-infested, so there wasn't a lot to go by. We had platforms in the Cook Inlet near Anchorage, but it's not the same, but at least we had ice-loading and we had platforms out there since the late sixties. People had been working and understood ice reasonably well, and they've continued to develop that technology up there.

The last one was how to handle logistics of just getting food and fuel and materials up there to do things. We determined, broad ranges, of what it would take. We didn't have precise numbers, but we did a lot of scenario planning and generally determined what it would take. The upshot was that we felt we could do it, and the subsurface folks said there were broad ranges of potential oil and gas. Finally they concluded that under very bad conditions it was not likely that you could develop the project, but under really good conditions it would be very attractive. There was good room in the middle so they said let's go, so we went and did a land grab, and they essentially acquired almost over 90 percent of the leases. We did a land grab.

JT: Was it very expensive?

CE: Yes, it was a very expensive one. After those studies, as they were getting ready for the lease sale, I was transferred down to work on the deepwater.

JT: Did you write any papers for like OTC or anything that might describe the processes and the studies that you guys did?

CE: No, because they were all very proprietary at the time. Prior to lease sale, you did not want to divulge any information, it was all confidential. I know I can talk about it now, but back then we didn't write papers for the public at all. We had internal reports, of course, and presentations to senior management, because that was a critical decision whether they were going to spend millions of dollars, and that was just to get the leases. Then they had to go do the exploration, because once they had the leases, they still had to start the seismic work and process it and interpret it.

They did go out and drill, and they got results. I know they kept a lot of those results private and confidential for many years. I don't know how much they've actually divulged, because they have not developed that area yet. Some day they

might go back, under the right conditions, I know they've returned the leases, but Shell may want to go get them back, so they don't make any of that public.

JT: It sounded like it was a two-part decision. It was, (a), should we go to the Alaskan ice, or, (b) should we go to the deepwater?

CE: No.

JT: Was it and/or?

CE: No.

JT: Or was it both?

CE: It was both, because until you actually start drilling, you don't know, and both of them were not something you can do in a year's timeframe. It takes years to do this.

JT: So I'm imagining that a similar-type study was done for deepwater.

CE: Yes.

JT: Were you involved in it?

CE: I was not involved in the early days because this was going on simultaneously with the Chukchi Sea studies. They started some of their work in about 1986, at the same time that we started the Chukchi Sea work. I transferred to deepwater in about May of 1987. I went to New Orleans to work under Carl Wickizer. Carl was very instrumental in the early planning of the deepwater. He had a lot of experience, had done a lot of development work with new technologies in the seventies with Lockheed. He was a very seasoned individual, very good at understanding the risks of technology and able to look at it from some detail to a bigger picture. He was also very good at communicating that to our senior management. That's who I worked for starting in '87.

So he had me reporting to him. My responsibility was primarily looking at the development systems and floating structures from a subsea standpoint and trying to ascertain the best way to go for two or three developments that we were looking at. Dave Montague also reported to him at that time. Dave was responsible for the subsurface for the Production Department, not necessarily the Exploration Department. They also had subsurface production that worked with the exploration folks.

I want to talk a little about the subsurface part of it. The key was the geology, whether it would produce, and what rates we needed. How many barrels a day?

What quality of the crude would it produce? They didn't have very good knowledge of exactly what the subsurface would be like out into the deepwater that had been deposited how many years ago in the Mississippi Delta region.

So there was an ongoing study that went on for a while. I don't know exactly when it started, but I remember they formed a Turbidite Task Force Team when I was there, in about 1987. Dave and some other individuals were instrumental in that project. That study went on all the way into 1990. I remember that is when we took Auger up for final investment decision to sanction it, and the presentation was twofold; it was subsurface and then what the development system look like. The Turbidite Task Force Team was reporting out the subsurface part.

Prior to that timeframe, if you had a well in the Gulf of Mexico that produced 500 barrels a day or maybe a little more, you had a really good well. When we ran the economics in deepwater, it didn't work with 500. So the whole bet was, can you get it to produce 2,000 or 2500 barrels a day? That would really be great.

It would be good for you to talk to individuals like Dave Montague from the Task Force Team. Paul Sullivan is another person that worked on that. There are also some exploration folks. One of the key people that headed up exploration at a very senior level is Mike Flowers.

JT: Yes, I've met him.

CE: You need to talk to Mike. Mike should be able to give you this background as well. I remember the Task Force Team reporting out that they thought they could produce 2,000 to 5,000 barrels a day, and there were folks that were really skeptical about these 4,000, 5,000 barrels. "Come on. That's way out there. It would be great, but it's hard to believe." But to me, that was the critical element. It's getting to know the subsurface and the geology, because the subsurface was what really stepped out and made deepwater. It's not at all the same geology that was in the shallower waters, and it was getting confidence that you actually could produce something out there. Then there's other technology that came with the development of the drilling and production systems. In fact, I will come to that in a minute, because that was the big change between Auger and Mars.

JT: Great. So let me stop here for just a second. What were the functions of the Turbidite Task Force?

CE: They were to try to determine what the subsurface was like, what the geology was like, and what its productivity was. What would be its connectivity? In other words, it was thin layers. Were they isolated thin reservoirs that were not connected, which would require a well to each one of them? Or were they somehow connected and we could require a lot fewer wells, which was very important. Having to drill a lot of wells in deepwater versus drill a few is a big

economic advantage. Then we had to figure out if they could be pressured in such a way that they would produce 3,000, 5,000 barrels a day. As you know, they produced thousands more. There were wells that produced 10,000 barrels a day and even more than that.

JT: So they were going off of 3D seismic?

CE: That's why you need to talk to them. I don't recall exactly, because I remember they did studies where they actually were looking for outcroppings *on the surface*. I remember they made field trips where they saw turbidites over in France where they went and they took pictures of them and they studied them. Well, turbidites also exist from geologic time millions of years ago, and then the earth went through its crusts. I can't explain all this, I'm not a geologist, but some of it is exposed in various places where you can walk up and put your hand on it and see it. Now, you've got to say, is that similar? Because they have turbidites.

They found turbidite-type geology in France, they have some out in California. I've actually been to one of the places in California with some of the subsurface guys and looked at them. Of course, this one was a little different than that one, which is also probably a little bit different than what we had down in the Gulf of Mexico, but what could you learn from that? They were the experts, they tried to determine that and to understand the range of the risk and uncertainty of how broad that range was, and was this a piece of it really not good. Was 25 percent of it not going to work for us? Was that acceptable or not? Or is it only 5 percent or is it 50 percent that wasn't going to work? They had to somehow determine what the likelihood of that was.

Those are the folks you really need to talk to. In my opinion, understanding what's down there was at least half of the challenge or more. That's because what you make money on is the oil and gas, and primarily the oil. So trying to determine if that's going to be there was fundamental. You can put all these nice floating structures out there and you can figure out how to drill, but if the reservoir is not there, you're not going to be in business very long.

JT: So when they brought it up to the higher echelon of management and produced this report, I'm assuming that they were encouraged.

CE: Oh, yeah, they sanctioned it.

JT: Then that was kind of the effort that made Shell upper management move forward.

CE: Right. As I mentioned, we had the Chukchi Sea and we had the deepwater. You hear about deepwater; you don't hear about Chukchi Sea, so obviously Chukchi Sea didn't work economically. It doesn't mean they didn't find oil up there.

Well, that's still confidential. Once I was transferred, I don't even know exactly what they found. I presume we found something, but I don't know what we found and I don't know the quantities. I don't know if it's as thick as tar or what the quality of that crude is, but it's never been developed, and it may be developed if there's some there. It may be developed twenty years from now if there's some there. It might be 200 years from now.

Deepwater, however, took off. I started in '87 and worked under Carl Wickizer. Gordon and Lou [Wilkerson] started working under Carl a couple years later, but I was working with them. Gordon was still doing Bullwinkle, they were still building that. Lou was off doing, if I remember right, a CO2 pipeline project in West Texas at that time. I think that's what Lou was doing, I'm pretty certain that was it.

So I was down here in New Orleans working on this, trying to determine how we were going to develop from what type of development systems, and we were looking at subsurface. The first development we looked was Popeye. I remember it was 2160 feet of water, and we were looking to develop that with subsea technology. Another one that we discovered was called Ram-Powell. Those weren't all discovered in that '86, '87 period but very closely right after that because they were exploring out in deepwater in '87, '88, and they were making these.

We had partners on some and we didn't have partners in others. We looked at just trying to get the general technology that would work for each one of them. So we were looking at various developments and then trying to rank which ones to go forward with. We were working on primarily four development systems. One was a subsea system, another one was a floating production system, which had somewhat of a conventional mooring. Then the other one was a tension-leg platform. However, we always had to dabble a bit with the compliant tower. We had a compliant tower. There were four types of development systems. We tried to apply those to various developments in different water depths, and we tried to look at it generically so we weren't looking at just one. We just had them for different water depths and different conditions while they were exploring.

We eventually stacked up. Now that we look back at it, we had Popeye; we had Auger; we had Mars; and we had Ram-Powell. Carl, with his associates and peers at his level, Mike Flowers was one of them. There's another one, a very tall individual. His name is John Hellings. He was a really sharp at drilling. They all reported to Wade Dover at that time. Jack Little from the E&P side and Mike Flowers were involved. They were trying to determine which one we should go for and what the scheme and the timing were.

We ended up deciding to go with Auger first, and one of the reasons was because we had no partners on it. On Ram-Powell, we had been working with Exxon, Amoco, and Shell.

JT: They went in together on the lease?

CE: Yeah, they had gone together on that lease. Each partner got a third, which was very difficult to negotiate. It was very difficult to ever agree to anything, so everything took forever to get sorted out, agreed to. It just was taking a long time, so we decided, "Okay, that's not going to be first. We'll make that second or third." And then it was decided that Mars would be second or third as well. Mars only had one partner; it was BP.

JT: So that was another reason why you guys waited.

CE: Yes. Part of the arguments on Ram-Powell was that one company thought it should be a floating production system, another one thought it should be a TLP, another one, I can't remember. Lou will know because he ended up with Ram-Powell. Lou was selected. I remember this because we had a meeting. It headed by Carl, and he brought in the three of us.

JT: Who were the three?

CE: It was Gordon, myself, and Lou. We were the three project managers. This was in 1989. Carl gave us an assignment to individually come up with how we would develop the projects. He primarily asked us to develop a plan individually for how we were going to develop Auger, and there was something else. I remember I was very focused on Auger, and I'd been up to that point in time marshalling a lot of the technology, working with the research people, working with Head Office Civil Engineering, and doing a lot of up-front work. Gordon and Lou had just relatively come in within the last few months or so, completing Bullwinkle in like '88, early '89, they'd been there for a year or so.

Carl had us come in, and he had us each present to him. It was just the four of us. "How would you go about it? What do you think the risks are?" He said, "Okay, now, let me go think. I want to meet with you guys and tell you who's going to get which project."

JT: Do you remember how long did you work on that presentation?

CE: I don't remember. It was a while, but I was so immersed in it; I had already been working since '87. It had been two-plus years, so I had my view on how I was going to go do some certain things, how it would be organized. We weren't all that much different, but we did differ in the details.

I think Carl just wanted to get our views on everything. When I look back, I think he had made up in his mind on how structure it for various reasons. What he ended up doing is he had me take on Auger. He said, "You take the first one." He gave Lou Ram-Powell, and I think the reason why he gave Lou Ram-Powell, Lou and Gordon know this. The reason is that if Gordon can't make a decision very quickly, after a while he'll just go, "The hell with it," and just kind go with the partners. Lou, on the other hand, can really grind with them. If there's ambiguity and they just can't reach decisions, he just grinds and grinds with them.

JT: He enjoyed that?

CE: It's not that he enjoyed it; he could just take it. There was a lot of that, just lots of it, and he wouldn't let it eat at him. So Lou got Ram-Powell and then Gordon got Mars.

There was a little bit of restructuring after that. Eventually Auger took off and it was consuming a lot of capital. It was always deemed as a lot of capital, a lot of focus. The other ones were to wait and to take some time on them. They restructured a little where Gordon oversaw everything with Dan and Lou reporting to him. It was kind of a different organization; they were kind of waiting to see what we learned off of Auger.

JT: Because I'm assuming that you were the junior of these three guys.

CE: Yes, I was. But like I said, in Shell there's a point where if you got some experience, they give it to you. By then I had been with the company for almost fifteen years, and you just think about fifteen years. People should be pretty much in the prime by fifteen years, they should be able to carry on and do something and get things done if they're doing their job. So I was fortunate. I'll just stop there.

I headed up Auger to finalize the development planning for it. We were bidding out internationally as well as domestically and ended up awarding a large portion of that work to a company by the name of Belleli in Italy. Interestingly, that was a company we had never worked with before. We were asking ourselves, who is this company? Could you trust them? Would they deliver? Would they try to make money on change orders? That's a strategy some companies will do when they really don't care about delivering and they're just worried about themselves. So we ended up using them and McDermott, principally, and, of course, a number of topside nodules were to various other fabrication yards along the Gulf Coast, all the way from Mississippi to Louisiana to Texas. We had work on components going on in many states within the United States as well. It was a very large undertaking.

I managed Auger all the way through from construction to installation. It was in late 1993 that Pat Dunn, who had headed up the Head Office Civil Engineering, decided to retire, and at that point I was asked to transfer in. We were on the final stages of Auger when I went over and led up Head Office Civil Engineering. That was the group responsible for designing and overseeing the design of deepwater systems. That was in '93, and we were into Mars, Ram-Powell, and all that.

I worked on Mars and Ram-Powell from a different perspective. I was no longer a project manager, I was now providing the actual design. We were always heavily involved working side by side with the project manager and his construction group. Most of the people went back and forth between these various groups. Dan worked in Head Office Civil Engineering; Gordon also worked in Head Office Civil Engineering. We all worked in that group at some point in our careers at least once or twice. We all held some kind of relationship or allegiance with Pat Dunn, because he was well known within the industry, not only within Shell. He was a highly respected individual. You really should talk to him as well.

JT: It's a strategy of Shell, I'm assuming, to get you guys involved in as much as you possibly can during the course of your time there, to get you better trained.

CE: That's what I'm saying; we all knew one another, we all worked together, and we all developed a keen respect for the contractors. We knew that our success depended upon them and our relationship with them, on being fair with them, and on them knowing exactly what it was we wanted as early as we possibly could. We knew that we needed to have good maturity in our designs whenever we could because that allowed them to do their business more efficiently. We knew that they needed to make money as well and that they needed not only to be successful, but to be seen as being successful, and that that would benefit us as well.

We worked an awful lot on how to have good relationships with contractors, and we had good relationships with McDermott during seventies and the eighties. We had some rocky relationships with, say, Heerema, and that really came out during Bullwinkle. We had some really rocky relationships there, and I remember a cadre of us meeting and talking about how we needed to really strengthen the relationship with various contractors, how we needed to work on the mindset, because that was a culture. We had to get all of our staff, our younger engineers, our construction superintendents, foremen, project managers, all thinking alike. That was a key piece of it, and we started working on that in the late eighties. Gordon was very important piece of that, Lou as well, and myself, and Carl Wickizer. Carl was heavily involved in that and so was Pat Dunn.

So that was going on, and that's another key element other than just having good structural technical capability and marine engineering capability and all that. We were technically strong, but you needed to know how to do good project management as well. Of course, I've said as much as I will about the subsurface, but that was very important, and those people did their work and they knew what they were doing.

Now, one of the key things that we learned from Auger was that we had made some time-wise critical decisions that we had to make. There were critical decisions on the drill risers and the technology for the drill risers and work-over risers for the wells that we had to make. I remember back before the end of 1988, somewhere in that timeframe, and there were choices, and it wasn't always that clear.

There was a real tall fellow we used to refer to as Big John. His name John Hellings. That was his background, and Carl had a strong background in that as well. There were also some younger engineers that were very sharp technically within the Drilling and Production Department. We made some decisions to go one particular way that was more, I'll say, conservative, less risky for Auger. We wanted to build our confidence up in it, but it drove the design of the platform into this open bay area. If you actually were out in Auger, it looks much different as a TLP than the other TLPs, but it was a stepping stone and it worked and it was successful. They continued development work on this other more risky way of the drill and work-over risers for actually accessing the wells in deepwater as we continued on with Auger.

Then there were things we learned on Auger that actually fed into that, and we were able to make that change, and that was the key thing that changed between Auger and Mars and Ram-Powell. Mars and Ram-Powell are very similar, but Mars ended up being the next one because we were still having all these negotiations between three parties on Ram-Powell. It was just taking forever, and that's why it ended up being third. So Mars benefited from additional time to get the drilling and work-over technology for the wells changed so that we could change and make it more compact and put the wells in an array similar to just rows of wells and a well bay kind of conventional shallow water. That's because they would just be lined up and down in this well bay, whereas you go to Auger, there's this big opening and they're out and around.

JT: On the outside.

CE: They're not on the outside. The platform is a big rectangle like this, and then there's a big moon pool like this in there, and the wells are placed around it, whereas in the conventional one, it's right in here. It's not a moon pool, it's not over here. I mean, you could dive into the water in that moon pool.

In what we call a conventional TLP, the wells are just lined up, there's close spacing. We were worried that we couldn't have the wells really close together and actually access them on the seafloor in deepwater with things not banging into one another, it had a lot to do with some of the currents and how these things were going to respond in deepwater.

JT: Because it was the first?

CE: It was the first, and we needed that development. We needed that development time, and we needed some learning from Auger. But we also needed to get Auger going because we needed revenue; we were spending a lot of money in deepwater on this advanced technology R&D and on all the exploration work, and we needed to generate revenue.

JT: And you had the big leases in the Alaskan area?

CE: Shell needed money. We needed money, so we had to get moving on Auger, and that's what drove that one to go.

Mars and Ram-Powell benefited from the additional time and learning from Auger, and we subsequently learned actually how to improve working with the contractors. So Belleli built the hull on Auger, they built the hull on Mars, the hull, they built the hull on Ram-Powell, they built the hull on Ursa, they built the hull on—there's one more.

JT: Enchilada?

CE: No. Oh, what's the name? I should know. [Brutus]

JT: Na Kika?

CE: No. They didn't do Na Kika; with Na Kika, Belleli they eventually ran into financial problems. They were a good-sized company, family-owned, private. Mr. Belleli was well into his late eighties, and one of his sons was running the heating and air conditioning business. He had made some financial decisions without the knowledge of his father and his other two brothers, and it pulled the company down. It was unfortunate. They were very successful company and had been since 1947. We lost them, and that's how we ended up rebidding out after Mars, Ram-Powell, Ursa, and the next one. Mike Rainey was the young engineer; he was not that young but he was younger than I. At that time, you start calling everyone young, but he wasn't all that young. He was probably mid-thirties, and he headed that one up. We bid it, and we ended up building the hull for that one over in South Korea. That was our first real one. So we started doing work over in South Korea.

Anyway, I stayed with deepwater throughout that time period. Up until about 1986, 1987 a third of Shell Oil Company was public, and that's when Royal Dutch bought out the rest of us, and so we became fully Royal Dutch. They started bringing us into the fold about ten years later. In 1986 I was responsible for Head Office Civil Engineering, and that's when I was asked to take on a broader responsibility. We restructured a bit, and I started getting more responsibility for the facilities engineering, which is processing, and some subsea responsibilities. We also started working, taking on developments and working internationally for Royal Dutch Shell, not only in the Gulf of Mexico.

So 1996 to 1999 is where we evolved into doing more deepwater in places like West Africa and in Brazil, and it's grown since then, but it was all based upon what was being done in the Gulf of Mexico.

By the way, I left one out: Popeye. I'll come back to that one. There was another subsea project that had a development that was a little bit shallower than Popeye, and we said, "Hey, we need to do it." So we had a stepping stone for the deeper water floating systems. We wanted to go off of TLPs for roughly about ten years as the strategy was determined in '87 and '88 and it just ended up being Auger, Mars, Ram Powell, Ursa.

JT: Was economics the main reason for a TLP?

CE: We determined it was economics at time, and we also wanted to standardize, so we had a learning curve instead of bouncing around between technologies. We figured that it wasn't going to go on for a hundred years, but we still planned for a number of years. Notionally I'll say about ten years, that's what we need to carry that one through, learn, try to work with contractors, and try to stay with the same cadre of contractors so that they can also have their learning curves. That way we'll learn together and we'll get cost-efficient and schedule-efficient.

We also had another plan in which I wasn't directly involved at that point. I stayed with the floating systems, but Carl had others that took on the subsea system. I wish I could remember the name of the first one, but it was roughly 1,400 to 1,500 feet of water, then Popeye, and then there was going to be a jump out to Mensa. Mensa was the big Kahuna, because I remember being on the leadership team under Rich Patarozzi when we were making that decision, and the key decision is that one could have been developed with only two subsea wells flowing at each about 150 million cubic feet a day. We decided that we needed three wells. That's because there was no equipment that could kill a well flowing at that rate in the world, in deep water or in any water depth of that nature, because that was so prolific.

JT: Kill a well, you mean if there were problems.

CE: If it got away. If there was a problem, there was no way we could kill it; it was too unsafe. So we decided to be safer and to take the extra cost drilling a third well and that way have three 100 million cubic feet a day. A hundred million cubic feet a day is a big well, and that's what we were leading up to.

JT: So Mensa was a big gas reservoir?

CE: Mensa was big gas for just a very small number of wells. But that was the learning curve; we had a similar one going out and stepping out in deeper waters, subsea-wise, and we carried that on out. That's a whole other story of subsea. The person you need to talk to ended up reporting to me. That's because eventually in late 1990s, I ended up with all the subsea folks reporting, the facilities people reporting, Head Office Civil Engineering, naval architects, and anyone that had anything to do with that reporting to me. I was responsible for all those groups from roughly around 2000 to the time I retired in mid 2006.

The person you want to talk to on the subsea side of it is Doug Peart, P-e-a-r-t. Doug is still with Shell. His background is subsea wells and pipeline, and he was my right-hand man. He was general manager, I'll give you his number when we get ready to leave here because that's a whole story that should be part of this too, because there's floating systems and there's subsea systems, and, of course, you've got pipelines.

JT: You've got to get the oil and gas back to—that was one of the big questions that I asked both Dan and Gordon, and they weren't as sure.

CE: Oh no. See, in the late eighties I was involved in working very heavily with the R&D folks. Gordon and Lou were not, and that's part of the reason why Carl had me take it on, because we were still doing lots of development work. I was working very closely with our pipeline folks. I didn't get too actively engaged with the Subsea group until about 1997, and reengaged with them from a subsea standpoint.

But the pipeline was a key piece I worked with all the time. Then when I went into Head Office, we called it, and I took over the Civil Engineering Group. I was also tapped to coordinate the research program for the next three to four years. I didn't manage it on day-by-day basis, but I coordinated the projects and the funding for it from Head Office. That was to make sure that we were working on the right things, because we were still doing a lot of development for our deepwater risers and pipelines and subsea.

JT: With the remaining time, and let me know if you need to prepare for a meeting or anything—

CE: No, I've got about twenty minutes here, so I'm about to stop here and just let you go now.

JT: Let's focus on that, because that's one area where there is a gap about the subsea and the pipelines, and you can probably inform this project better than those who we've met with so far. But before we get into that, there's one thing that piqued my interest. To what degree does that difference influence the types of projects you do between a major oil discovery and a major gas discovery? Like, let's say, Mars versus Mensa. When you've got a lot of oil and you've got a lot of gas, how does the two differences there influence the way a project is managed, designed, and thought about? Is there a big difference?

CE: I'd say from a project management standpoint that there's not a big difference. There is however, a difference in the technology and hardware. We learned one thing that became obvious in a large gas facility as Mensa that created a bit of a problem for us. Mensa was extremely dry gas, which means it doesn't have any moisture or liquids to it. That's why we felt we could flow it a long ways in a pipeline without having to have any equipment down there to do separation or handle a slug of liquid coming its way. What we overlooked, however, is that we had never worked with that size of volume before. I don't remember the ratios, but I'll say that we considered dry gas being anything with condensate or moisture less than 2 percent or 3 percent. I used to know these numbers, but since I'm no longer working and have been away and I'm approaching sixty, I tend to forget. Well, I'm not that old, but I'm getting there.

Anyway, the thing is that all of sudden you're dealing with wells that produce 100,000 and you multiply and say condensate is only 1 percent. It ended up being quite a few barrels but we hadn't done that simple calculation, and all of a sudden we found we had this slug coming at us. So it does make a difference, and you have to really be aware of what it is that you are producing because it will dictate how many miles away the fields can be that you can produce back to the host platform.

That was very critical when we did Na Kika. That is a central processing platform; it's not a TLP. It's a floating production system with no wells; the reservoirs are out away from it. Na Kika is a Polynesian word for octopus. So its tentacles go on out to these reservoirs and are used to develop Na Kika. Now, if you really want to know more about Na Kika, I'll let you talk to the project manager, he's right next door. He retired when I did. He wanted to come with me after he'd worked for thirty-one years for Shell. By the way, he was the design engineer for Eureka and then was the design engineer for Boxer. He was also the design engineer for the hull for Auger and a number of the other structures.

JT: What's his name?

CE: Bill Luyties.

JT: How do you spell that last name?

CE: L-u-y-t-i-e-s. He was the project manager on Na Kika, and that involved making selections as to how far you can be out. If it's gas, you can be further out than in some oil fields. Oil, gas, and water are a good mix because nothing's happening. However, if you get too much water and you're down there and under certain pressure conditions, you will hydrate up and you'll freeze up your lines. The key thing that you're worried about all the time in deep water is, are you going to hydrate the wells up? Are you going to hydrate your pipelines up?

That's the makeup of the fluids and gas that you have. The temperature and pressure regime that you're in there is what you're managing all the time, and that is a key component for what you can and can't do over what distances and the equipment that you need. Na Kika has got various loops where you could circulate things if you shut in a well. You may have to circulate certain liquids or oil back into the lines so that they will not hydrate up. There are loops that are designed for that purpose. It's a very complex system that's been designed so that you can develop these various reservoirs out onto the octopus' tentacles so you don't hydrate up under certain shunting conditions. They're all tied in with various loops as well.

JT: So that's all built in and from the nineties, all the knowledge and . . .

CE: Yes, and the best person to really talk to about that is Doug Peart. From the pipeline standpoint, one of the guys that works for him has been involved since Auger. He was out at the lab doing the research on risers and pipelines, his name will come to me in a few minutes. He works for Doug. I'll call Doug first, I'll get you hooked up with Doug.

JT: Where does he live?

CE: He's in Houston. He's still working, for sure.

JT: We've got him on the list of individuals to meet with.

CE: You do?

JT: Yes, sir. His name came across.

CE: Another good one is Robert Patterson. He replaced me when I retired. Robert worked on Auger, and at that time he was a young engineer with a Ph.D. He was involved in a lot of the Elastomer technology, which we needed for key

connections on our deepwater systems for connecting risers up so that they would be secure. You were bringing all this gas and even oil into the platforms and you needed the Elastomer technology, which we used.

We took technologies from other places, but you had to reconfigure them so they would fit. Some of that technology came from NASA. I know the tendons at the very bottom are a Parker connection on the TLP. That's a very large Parker connection, an old piece of technology. You've had a Parker pen before; you have Parker pens now. They're no longer made by Parker, but the technology is the same. You know that little device that you push down and it clicks, and then you push down and it clicks again; that's the same connection. It comes down and goes through some guides and it clicks, it comes up and it's in a holding deal, and you push it down and it goes through some other guides, and it clicks and comes out. That's exactly the same connection that's in the bottom of a TLP, so that we lower the tendon down, it goes through these Parker guides. We de-balance, come up, are locked, and we leave the buoyancy up there so that we're fully locked in there for as long as we ever want to, and we're allowed to even move a bit so that this thing will never go down far enough.

But some day they'll have to remove those platforms, and what they'll do is they'll ballast. They'll put water in there, they'll lower the tendons down, they'll take them through those guides, it will click, it will come up, and we're ready to float away.

JT: Is that something that you all worked on at the research lab?

CE: Yeah, we did back in the late eighties. I don't remember which one of the researchers did. Jim Stevens would know. He's retired. Robert was a young engineer in that group, a very young engineer at that time. He did not work on that. Jim Stevens is retired, he's in the Hill Country now; he may have been there. I don't remember which one of the guys came up with it, but that's what it is.

A lot of times new technology is truly new, and a lot of times you say, "You know, I've got an idea. I remember this. That was used for a fountain pen, and we're going to use it over here." Now we've got to make it robust enough to take the loads. And that was the key issue; can you take these large loads? What kind of steel? Will it work? Will it bind up? So we built them and we tested them large-scale.

In the late eighties and even into the early nineties, and Robert [Patterson] will tell you we had about two critical things while we were building this, and I was getting very nervous during Auger. We had a couple key connections that were related to the risers, to the wells, and how they came up. One was for where the wells connected to the deck and where they had the heave compensation. We

asked ourselves, is that Elastomer going to survive? Is it going to be robust? Similarly, where the pipeline risers came up to the platform so we could export it, there was a different connection, but had Elastomers in there. We needed it.

We had different competing designs for each one of them, and we were doing small-scale and large-scale tests on these. One would work and we'd repeat it, and then it wouldn't work, and we were starting to run out of time. I was spending lots of money and we had to make decisions. Robert was key into that. We were working with some companies like Oil States out of Dallas and a couple other key companies down in Houston, and we were trying to make decisions. We were trying to do it on reliability and quality as well as cost, and then we still had to ask ourselves, could it be built in time? We needed to get it integrated into this hull and into the deck, risers attached to the hull for the pipelines and the wells attached to that.

I remember working with Robert [Patterson]. He's a sharp guy; he's a Ph.D., not I, and I needed some real clean recommendations from him. Of course, I understood enough of what the results were saying, and I wasn't really comfortable about the costs at the time. Those were critical decisions that were going on. All that laid the foundation, because those key elements were then used on Mars, Ram-Powell, and all the other subsequent deepwater projects.

JT: Where is Robert today?

CE: Doug Peart works for him. Robert replaced me when I retired. He's still with Shell, he should be on that list. If not, let me know. I'll give you those. I'll even talk to the guys, just like Gordon contacted me. You want to talk to Doug. I think it's good talking to Robert's good to get those early days. On the subsurface side, you should talk to Dave Montague and Mike Flowers.

It's too bad Carl passed away two years ago, he would have been key. He would have been almost one of the old-timers because he did a lot of the subsea work in the seventies, where they were looking at doing them where instead of doing the wells, as you've now seen probably pictures of them there in the ocean, they're sitting out there. There was this vision that they were going to be able to do them by building one-atmosphere chambers down there. He led a project working with Lockheed, and they actually built some and tested them in the Gulf of Mexico, and eventually determined it wasn't going to be cost-effective. He was involved in all that.

JT: Let's run through the pipelines real quick, because that's one thing that I'm really interested in. We're going to write a handful of analytical papers to go along with this final report, and I think one of the areas that I'm really interested in is the pipelines.

CE: Frans Kopp, K-o-p-p. I knew it would come back to me. He's a person you need to talk to. I can give you a very high level. Frans, F-r-a-n-s. He works for Doug and them. I can give you his phone number if you want it. I haven't spoken to him in three years, but I don't think his number has changed.

JT: So subsea, pipeline?

CE: He's pipeline. Doug Peart has subsea and pipeline and Frans reports to him. But Frans is *the* pipeline guy. He was involved in doing the research work in the early days and has stayed with it all the way through. He will tell you from the mid-eighties all the way through. You can reach Doug.

JT: All Shell offices?

CE: Yes, all Shell.

JT: You were involved in research and development. You got there in the early nineties. Tell me a little about it.

CE: I was involved with the research and development group since 1987. I headed up the coordination of their budget and their program and made certain that they were managing them like projects. Actually, I started that under Carl in about '89. They were saying that they needed to run them like projects so that they would deliver things on time. We needed to get the work done on time.

JT: So from a pipeline perspective, for this era of deepwater TLPs you've got the geology in one part, the technology for the structure is another part, dealing with the contractors and improving relationships with them is another part.

CE: Yeah.

JT: But what about the pipelines? That seems like an integral component.

CE: It is.

JT: How do you get a pipeline down 3,000 feet of water, 200 miles out, and nothing had been done up to that time?

CE: Same thing. Some of them like Heerema and McDermott were the same marine contractors. Some of them were doing onshore fabrication like McDermott, Kiewit, and others.

On the marine side, we needed to develop the capability for installing not only the mooring systems, the TLP, and the tendons, but we also needed to figure out how to install the subsea equipment as well as the risers and the pipelines. We were

working very much from an R&D technology development standpoint in Shell, as well as working with the contractors. You need the equipment to actually execute what it is that you're actually going to fabricate, and they needed to work hand-in-glove, so we did lots of testing of the equipment on various options as well.

We started that program. Actually, that was under a man by the name of Don Barry, who's retired; he might be a good person to talk to get the old history. Frans worked for Don Barry, and Don was kind of like the Pat Dunn of civil engineering. He was in Head Office, but he had the pipeline group, and they were all separate. It was in the nineties that they eventually brought them together, and they were brought all together under me, but that was later on. But in early days, they were separated but they all still worked close together. But they're all in Head Office.

I worked very closely with Don and them, but I was more of a project manager trying to make certain that we understood, for example, what are your risks? What's your timeframe? What are your options? How does it work? What works? What doesn't work? I was responsible for trying to connect all the parts and pieces, connecting the pipeline, the risers, to the hull, the tendons, the topsides and everything else. I had the whole picture. Each one of these had a component. I wasn't the technical expert on each one of the components, but I had to pull the whole development system together. That's what I worked on from 1987 to 1990, on pulling the technologies together into a cohesive system, which ended up being Auger, and then I managed Auger through its execution from '90 to '93. That was my role.

As we were executing it, I was very keenly aware of what we were developing, because we were still even doing development work. As I mentioned, we were developing work on various key components, and we constantly had to feed that back into the others working on them so that they could incorporate them into Mars and Ram-Powell. The only piece I didn't work at that point in time was subsea wells. But I most definitely worked on pipelines, because I had to have the pipelines.

JT: Where did the gas and oil pipelines go from Auger back to shore?

CE: They went to back to shallow water platforms. So we had the wells that came up, and they came up with oil and gas and water, and we separated them.

JT: On the Auger production facility?

CE: On the facilities themselves, so we had a separate pipeline for oil, and I can't remember exactly which platform it went through. It went through and across another shallow-water platform and eventually went to refinery.

JT: To the Norco refinery?

CE: Yes, that one went into Norco. Gas went to a shallow-water platform and then tied into a common pipeline system. I can't remember which one it is, there are so many out there. I could probably dig it up. I still have the stuff that I actually used to present some of this back in the 1990s. Auger was such a highlight in my career that I kept one of the key FID presentations, and I still have them.

JT: So the contractor for laying that pipeline for Auger would have been McDermott?

CE: Yes. McDermott has done a number of our pipelines in subsea. Heerema is another one. Technip, a French company, is another one that has come into play; they did a lot of our work in West Africa in our deepwater developments over there. Those are the three key players right now. Heerema is one of the big ones. There are some other contractors that have come into play now since then, some of these other companies have been coming up. What they are is they're individuals that have left, say, McDermott, or they've left Heerema, and they go and create another company. Like there's another company called Allseas.

JT: Allseas?

CE: Allseas. They did a very good job. They're one of the Heerema brothers. There are three Heerema brothers. They don't get along very well, so when their father passed away, one of them took over Heerema. The other two went and started two other marine construction companies, and they compete against one another. So now we have some good competition. [laughs] Allseas does that, and they come in the Gulf of Mexico too.

JT: I'm assuming is that you guys are also having research and development for new technologies, that these contractors are improving on their technology as well.

CE: Yes.

JT: I mean, going from 500 foot to 1,000 foot is one challenge, but going to 2,000 or 3,000 foot to lay a pipeline requires a whole new set of technologies.

CE: Yeah. In fact, Heerema would be a good company to contact. Bruce Gresham is out of Houston; you could contact Bruce, he's been involved in this. Now, he's more from the business side of it, he has a good background. If you talk to Bruce, he might arrange one of his other people to talk to you about the development and evolution of their equipment for doing pipeline work as well as installation of deepwater platforms and the mooring systems. That would be Bruce Gresham. Gresham is G-r-e-s-h-a-m.

JT: Which other big TLP projects did Heerema work with?

CE: In some form or fashion, they've been involved in, I think, in every one of them.

JT: Along with McDermott?

CE: McDermott actually has not been involved in every one of them, because as time went on, they got locked into doing some work exclusively for BP for a while. They've struggled a financially, and they're not the company today that they were years ago. Kiewit's been a key company. You go down to Corpus Christi, you see—

JT: I'm going down there later this summer.

CE: You'll get a chance to see two nice cranes. One would be Kiewit's. Another one is from their former yard, which was bought by Technip. Kiewit built a new yard. We working with them helped them design the first one, and they took that concept and made it even larger, so they have a large crane that can lift about 10, 11, 12,000 tons.

JT: All right. We're wrapped up here. Can I get you to sign this? Chuck, this is just describing the project as I did when I showed up. If you just sign your name, I can fill all that information in later. I've got your card. It basically describes the project, and you're stating that you have agreed to participate. Then this is another form, if you would sign your name here. What this form does is it gives University of Houston permission to archive this information on it and use it for scholarly purposes.

CE: Yes.

JT: Thanks so much, man, I really appreciate it.

CE: Good talking with you. If you have any questions, or if you need clarification, but probably more so if you want to follow up with any of these other guys or are having any problems, just contact me.

[End of interview]