BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT

Interviewee:	Gordon Sterling
Date:	June 1, 2009
Place:	The Woodlands, Texas
Interviewer:	Tyler Priest and Jason Theriot
Ethnographic preface:	Gordon Sterling was raised in Ontario, Canada, and quickly developed an interest in engineering. He earned a master's degree in structural engineering at Lehigh University in Pennsylvania in 1965, and soon ended up with Shell Oil in Houston. Two years later, working out of New Orleans for Shell's central engineering group, Sterling began working on major design projects for platforms in the shallow waters of the Gulf of Mexico. From there, Sterling gained experience at the Bellaire Research Center, and then worked on designing the early deepwater fixed platforms, including Shell's Cognac and Bullwinkle developments. Gordon was then named manager of "Project X," which turned out to be the Mars tension-leg platform development. Gordon retired from Shell in April 2000.

File 1

TP: This is an interview with Mr. Gordon Sterling at his home in the Woodlands, on June 1, 2009. The interviewers are Tyler Priest and Jason Theriot. Let's start off with some background. Where did you grow up, where did you go to school, and how did you get interested in this business?

GS: I was born and raised in Ontario, Canada. In Lake Huron, there's a large island, the largest freshwater island in the world, they're proud of saying, and it's called the Manitoulin Island, named after the Indian god Manitou. That's where I was born and raised, on a farm. Somewhere along the way I had an outstanding public school teacher who got me interested in learning and in engineering. From the time I was about fourteen, I wanted to be an engineer and build bridges and dams, which I never got to do, but I did other things.

I was the first in our family to ever go to a university. I went to the Waterloo Co-Operative School in Waterloo, Ontario, which is still there, and has become a really good university. We would go to school for three months and we'd work for three months. That's how I got my basic degree. Then I got a Master's degree in Structural Engineering at Lehigh in Pennsylvania. While I was there, a friend of mine interviewed with Shell on the West Coast and came back with stories about exciting things that were going on in the ocean.

TP: What year would this have been?

GS: I graduated from Waterloo in '63 and from Lehigh in '65. So in '64, he came back with these stories. In '65 I interviewed with Shell and was offered a job in Houston. At the time, when I joined Shell, I was working in the small offshore group here out of Houston, and we were working in water depths like 50 feet at the time. The industry at that time was in around 300 feet.

TP: So in Houston were you mainly looking at offshore Texas?

GS: Yes, offshore Texas; mainly the state regions, the really deep offshore. Texas goes out to ten miles, that was their legal right; so that's where I got started.

Then I moved to New Orleans and I worked on the design of a structure in 325 feet of water, which was pretty much as deep as we were going at the time. Of course drilling was always a few hundred feet ahead of us, sometimes a lot further ahead of us when they got into the floating stuff.

TP: So when did you move over to New Orleans?

GS: In 1967.

TP: Who was over there? Who did you join when you moved over there?

GS: Well, the head of the design group when I moved over there was a guy named Bob Bea.

TP: This is the Central Engineering Group.

GS: C stood for Construction. That was the Construction Design Group, CDG.

TP: I think that was established in '65 or somewhere around there.

GS: Probably, because they were already there. One of the trips I made from Houston to New Orleans, when I was working in Houston, was to meet with those guys because we were designing our own small structures here. The first structure I designed was thirty-five feet of water.

TP: So was Peter Marshall there too?

GS: Peter was there. Bob Bea was there. Irwin Boas [phonetic] and Gene Strovack [phonetic], Bobby [Robert] Cox was there too. Most of those guys were ten-year people at the time, eight to ten years. Not Peter. Peter and Bob had only been there about four years. Yeah, that was the center point of the technology for the development. At the time, we were struggling with the really basic issues of what are the wave heights. We later did an awful lot of research on it, but at the time it was go talk to consultants. Al Glenn [phonetic] was the main one we used. You'd get a wave height, and then the next question was, even if you knew the wave height, how did you calculate the wave particle motions and the forces? So that led in the seventies, and the late sixties as well, to a lot of research into hurricane waves, wave heights, and so on, and frankly, it's still going on. A storm like Katrina or Ike comes through, it changes the view of the statistics of the so-called hundred-year storm.

So then after working there, I worked on some design projects. I used to joke about the fact that one of my first reports in Shell was called the *Design of South Pass 70*, and the second report was the *Failure of South Pass 70*. Because Hurricane Camille came through and caused soil slides and the platform was destroyed. Basically the soil slid out from underneath it fell over, which Bob Bea and Pete Arnold and others had predicted that under certain wave conditions would happen. Still, looking back over it, you just shake your head and say: Mother Nature can be kind of cruel. Because our technology was right. We understood the problem. Shell decided to take the risk that it wouldn't happen in the lifespan of the platform. So we put the platform in in '68, Camille came in '69 and took it out, and maybe Ike, maybe Rita, I'm not sure, one of those, but between 1969 and about 2004 or 2005, there wasn't any storm that would have ever caused a problem with that platform. It would have served its full life. It

would have gotten away with it. Instead, it came out about eight months after we put it in.

JT: Let me ask a question. What's kind of the general changes that you guys made to avoid a soil slide like that?

GS: Well, basically the answer is, you really couldn't do anything. Frankly, we designed it in sort of halfway steps. We designed it; we looked at the soils and said we could expect maybe thirty foot of soil movement. So we designed the foundation that, if it had it been that shallow, it would survive. But when it happened, it was much deeper. We knew from the beginning that there was no way. There just was no solution.

Today, we had to face that same issue, and in fact, after Ike, one of those storms recently, there was a lot of soil movement again. And this time it probably destroyed some oil platforms that nobody paid much attention to anymore, it probably also moved a lot of pipelines around. And so it's still a potential issue except that now it's the old parts of the fields and not producing very much, so it doesn't get as much attention. If the bottom of this place slid seventy, eighty feet, there isn't much you can do. So it was a risk.

TP: You just don't install them in those locations.

GS: Yeah. I mean, we went back out and what they did do, and maybe this should clarify this, I guess, so we went back out after Camille, after the soil slides, about three years later or something like that, and Peter Arnold designed a structure and put it in there. But what they did is they took a lot of soil borings and they found an area up north that, according to the soil, you could make some pretty good estimates of whether it had ever happened based on the soil strength, and they found an area where it never had happened, soil movements had never happened in the past. So they put the structure up there and directionally drilled down into the reservoir. But had we been wrong and had there been sufficient wave over-pressure to cause it to move, there was no way of preventing it.

By that time, the industry had already been using down-hole safety valves in the wells, so there wasn't a pollution event. The wells were blocked, although it took a while for them to get in and pump in the cement to permanently do it, but there wasn't any pollution because of the well bed, because the whole thing went down. It took out the wells and everything.

I enjoyed all that I was doing because I happened to be there when we were moving our way out, literally moving our way. I'll comment on offshore California, where I didn't do much work in; but in the Gulf of Mexico, the water depth, it goes out like this, so we literally could work our way out. Now we're in

300 and now we're in 600, and so on. The guys working off California had a different problem.

TP: Because it drops right off.

GS: It drops off. So somewhere in the sixties and the seventies, when we were in the Gulf working on fixed platforms and so on, the people off California were addressing a different issue, which I didn't get involved in. You probably talked to Howard Shatto, people like that. It's just too damn deep. So how do we drill in the Gulf? At the time, we had submersibles that sat on the sea floor. We had jack-ups that sat on the sea floor. By the time I joined Shell, Cullop et. al. had designed that first semi-submersible. But even those weren't being used in really deep water, whereas off the West Coast, they absolutely needed them. So we were working our way out. That's why Cognac came along in '73 or '74. I was at Research Center from '70 to '74.

TP: Bellaire?

GS: Bellaire was a great assignment. I was in charge of the Civil Engineering Research Group. "Skip" Ward worked for me.

TP: I know a lot about the geological and geophysical research at Bellaire, but I haven't really talked to anyone who can speak to the engineering research that was being done there.

GS: We had civil engineering; we called it civil engineering but it was offshore. That was actually drilling engineering. They all worked for director.

TP: How did the group in Bellaire interface with the Construction Design Group in New Orleans?

GS: I had a small group of about six. We spent a lot of time together. At the time, Pat Dunn, Bob Bea, and Peter Marshall, those guys were all in that group. It was an interesting time because they would have a research budget and we at the lab would have a research budget, and they would spend part of their money at the lab and part of it with consultants and so on. So, because of that, we met often to decide what it is we really needed to be working on. At the time it was foundations, soil, determining the capacity of a driven pile and how do you determine it, how do you take soil borings. McClelland Engineering led the way in that, but we worked with them a lot.

TP: We interviewed Brian McClelland [phonetic].

GS: You did?

TP: Yeah, for the OEC.

GS: A great guy. He's not well at all now. And John Vogt [phonetic].

TP: Yes. We interviewed him, too.

GS: So they were leading the way in that, but we were doing a lot of research on piling and foundations. The second area where we did a lot of research at the time was on structural strength and where tubular members come together. This member comes into that member and welds. There was a lot of research done on the capacity of tubular joints. Peter Marshall did a lot of that.

Then, of course, an awful lot of work was being done at the time on the question of waves. How high do they get? If you know how high they are, how do you calculate what's called the kinematics, the wave particle motions? And if you know those, how do you calculate forces?

TP: Then after Camille, those wave heights got a lot higher, the maximum maximum.

GS: Of some of the early structures I designed, *Southpass 70* structure was for 58, and that's one of the ones that went out under the soil slide. But its neighbor a little further up survived, even though the waves were probably close to 80 feet. So the structures—non-engineers sometimes don't understand—they don't fail. If you design it for 58 feet, they don't fail at 58.1. There's a lot of redundancy. We do a lot better than we used to do, but we still don't really know. It's a confused sea, it's lots of things. But at the time it was 58 foot.

Then after Camille, Bob Bea, and I guess "Skip" Ward, people like that got really looking at the data and they changed it and then we designed for about 78 feet by the time we got to Cognac. Cognac was designed for higher waves. Bullwinkle was certainly designed for in the high seventies. I hadn't been involved, but I understand after Rita and Katrina and Ike, those are probably even going to raise. Maybe not raise the design height, but raise the deck elevation so that in an extreme event, the water doesn't get into the deck, because that's where it can cause a lot of extra force.

So that research group, we were focusing on structural mechanics, foundations, and waves.

TP: And mainly from fixed platforms. Were you working on subsea too?

GS: Well, I wasn't. I did research mainly from fixed platforms. At that time, in that same group, they had a Subsea Group. Carl was involved, or was he involved at that point? I forget.

TP: Ron Gere [phonetic] was involved.

GS: Ron Gere and a guy named Claude Sellers [phonetic]. They had a small group. They were, in fact— and this is a not much known history because it got overtaken by other technology—they were looking at putting people on the sea floor.

TP: The one-atmosphere chambers.

GS: The one-atmosphere chambers. They did a lot of work on that with Lockheed. They need to know a little bit about the sea floor and a little bit about ocean currents and so on, but the research they were involved in was more of the how the hell are we going to do this, how do we get people down there safely and get them back safely, and things of that nature.

As an aside, Carl used to have a picture on his wall. They built the chamber and they put it down there and they operated it. In any case, it got bypassed because, over time, the industry figured out how to put wet systems subsea, and the ROV came along, which made it possible that you could have your eyes down there seeing things.

The reality of people working on the sea floor, I remember at one time Claude was a visionary in many ways and he had a model made up. He had a student from the University of Houston—I don't remember the young guy's name—working with him, and he made up a model of a subsea city running an oilfield. You'd go down and get down there and you'd live down there for whatever—I don't remember anymore—two weeks, I suppose, and you'd run this place and then you'd come out and another group would go in. Never, ever got to that point. So, yes, that research was going on at the same time, but most of the stuff, the oceanography and meteorology foundations, structural that we were working on didn't have that much application to their work.

TP: You said that you kept working your way further out with the fixed platforms and subsea became more and more of a futuristic technology.

GS: Yes. In fact, that used to be an internal debate within Shell. We'd say, "Okay, we're getting to a point where we're going to have to use subsea."

Then the CD group or Pat Dunn's group would look at it and say, "Oh, no, we can build a platform in 1,000 feet of water. You've got the Cognac in 1,000 feet of water."

The question was, can we extend this fixed-platform technology that far? Or when is it time for subsea? The subsea guys were, "It's time, it's time." Well, "No, we can build another platform." So we kept pushing.

TP: So you pulled out of Bellaire to work on Cognac, right?

GS: Yes, in 1974. What's interesting was in about '73, my boss, Finus Martin [phonetic], came and said, "You know, we need to put some far-reaching goal in our research program for next year. We're going to look at the technology needed to go to 1,000 feet with a fixed platform." So I said, "Fine."

We were meeting with the guys in New Orleans and I knew that, to some extent, that exploration was interested in what was deepwater in those days. But we just barely put a program together and were looking at some issues to evaluate and we heard that Shell had bought these leases in over 1,000 feet of water. Well, that changed then from a research to "Let's go do it."

I left Bellaire in '74 and went downtown to work for Pat. We were to design this structure in 1,000 feet of water. People in New Orleans had already been working on it on the quiet and they'd come up. Bobby [Robert] Cox had come up with this three-piece design. Exxon had already done something.

TP: Hondo.

GS: Hondo, in two pieces on the West Coast. The basis for that at the time was capability of equipment. We didn't have big vessels that could handle single-piece 1,000-foot structures, and launch them or upend them and so on. That was the basis behind the three-piece structure. So we got in and we saw a whole bunch of problems. You build this thing in three pieces, you take them out separately, set them in the ocean, and then put them together out there. How do you do all that? How do make sure the dimensions fit, the tolerances? What drove it was the availability of the various what derrick barges, launch barges, the equipment to do it. A few years later the industry, mainly Heerema, said, "Oh, you want to put in a 1,000-foot-plus structure. We'll build you an 800-foot launch barge."

Just an aside, looking back at Cognac and all that was involved, it would have been a stretch at the time to say, "Why don't you just build a bigger barge?" But over my years of experience, there is an aspect of this—I hate the word, but it's called paradigm. It's interesting how focused you can get in a certain mindset. We looked at it and we knew how to build structures. We looked around and saw the equipment, so we modified the structure because that's who we were within Shell. We were structural guys, and we modified the structure to fit the equipment. A different answer could just as well have been, "Why the hell don't we don't we modify the equipment to build their 1,000-foot structure?" Right? But anyway.

TP: It would have been really heavy structure, given the state of technology at the time. Cognac was a lot heavier than Bullwinkle.

GS: Well, and that was part of what drove the decision. I'm not in any way making negative comments about the construction companies, but if they had looked at it as a financial opportunity and said, "If there's going to be enough of these, we'll build a really big piece of equipment," we'd have been interested. Right? But we were looking at it from, "How are we going to get our field developed?" This is what McDermott has. This is what Brown & Root has.

TP: There was nobody else out there either, really. It would be hard to convince a Heerema or someone to build a barge just for one project. Right?

GS: It would have been happy to say, "Sure, sure we will. It's going to cost x million, and you're going to pay all of it." Which, by the time we got through solving all the other problems, might not have been a bad deal.

TP: Cognac was fraught with problems, right? Just looking at the picture of these derrick barges lowering that middle section down, I mean that must have been a trying time for everyone.

GS: We worked really hard. Once we got into it, and we underestimated the number of issues we had to solve to install it, but once we got into it, we did a good job of solving it. But you're right, it was a lot of long, hard days.

TP: I think Pat Dunn said there was at least one crisis every day.

GS: Yes. We were out there the day that we were getting ready to install the midsection and put it down on top of the base section. We had this Hewlett-Packard computer systems there monitoring, and they all failed. Completely failed. But we had a backup. We had ROVs and we had other ways of doing it. Would we have gone ahead? I think we would have. Thank God the computer system came back up in a couple of hours. I don't think we ever figured out what caused it. But yeah, it was a very exciting project.

TP: This wasn't the transponder system that you had? No, it was a different one.

GS: It was very exciting and it worked. Eventually, as an investment for Shell, it certainly paid off. In fact, it's still producing. Not much, but a few thousand barrels a day. That was put in in '77 or something.

TP: They paid a lot for those leases. I imagine that would have been a lot more profitable if they had been able to buy the leases for what you could buy them in the nineties or eighties.

GS: Oh, yeah, it was incredible. What was that? We paid 300 million.

TP: Three-hundred million, something like that, for the leases.

GS: Three-hundred million in 1974.

JT: Just for Cognac?

TP: Yeah.

JT: Wow.

GS: I don't know what we were getting for—

TP: And bonus. That's the bonus price.

GS: That's the bonus

TP: Then you had royalty on top that.

GS: I don't remember at the time. I was pretty young, I wasn't that involved in the economics of it. But when I think back on it, 300 million dollars, were we probably getting maybe six or eight dollars a barrel? We must have believed there was a huge amount there.

TP: Well, you did. That was a big bright spot prospect.

GS: Mike Forrest.

TP: Mike Forrest. Mike tells the story about how before that, the night before they bought the leases, he was grilled for hours about the certainty over these bright spots on the seismic record and what they indicated. But it did turn out to be a big field.

GS: Oh, yeah. It was well worth it. But after Cognac, I personally left offshore for the only two-year period in my entire career. I worked as a production superintendent for some of Shell's oldest fields up in Oklahoma.

TP: Really?

GS: Yeah, it was fun. I'm glad I did it. So that was in 1978, 1980. You know, old, old fields; fields that had been built or drilled in the 1910 or 1920 region.

TP: Just sort of a broadening assignment, to give you some exposure to the production side?

GS: By then it was the early eighties, there was a downturn in the offshore.

TP: Oh, I see.

GS: They wanted me to do that, and I wanted to try something different.

JT: They probably wanted to give you a break, huh? Go from 35 feet to 1,000 foot in ten years.

GS: That happened in 1981. Before that happened, in 1980, Shell U.S. had a company called Pectin. I worked on a project in West Africa, in Cameroon. Technically, it wasn't a big challenge. It was 150 feet of water, but it was very worthwhile because we, in the Gulf of Mexico, had gotten used to the fact that we had all this infrastructure support. So if you are offshore and you ran into a problem, you send in a helicopter or call somebody on the cell phones today, whatever, marine radio, and somebody, some supplier, National Oil Well or somebody has what you needed.

Offshore West Africa, you had to do a lot more planning and thinking and so on. The technical aspect wasn't particularly challenging. It was interesting. But it was only 150 feet of water, the wave heights were a lot less. But, how do you install it? I mean sure, it's simple, but it's so far away and it's going to cost a lot of money just to get the equipment there. So it was interesting.

Then I went into the onshore for two years, and Pat Dunn called me up one day and told me that I was coming back, because they had bought Bullwinkle. They got the Bullwinkle lease, so I came back in '74.

JT: Eighty-four .

GS: Right, '84. Cognac went from '74 to '78. Bullwinkle went from '84 to '88. I came back in '84 and headed up the Bullwinkle project team for two years and then I worked here in Houston.

TP: You went to Corpus then?

GS: No, we had to move to New Orleans. But yes, the platform was built in Corpus. But my offices were in New Orleans. I went over there in '85, actually. My offices were in New Orleans because Pat and his people did a lot of the technical design work.

TP: So what changes did you make in organizing the project when you went from Cognac to Bullwinkle? I know it's a different kind of platform, but in a way of managing this as an engineering project, did you do things differently?

GS: Well, yeah. The lessons were part of the benefit from having been on it. The lessons learned from Cognac in particular were that, quite frankly, we had underestimated the difficulty of solving the technical problems, and so by the time we got to Bullwinkle, of course, the industry had changed. Now, because of Exxon on the West Coast with Harmony and Heritage, they already were building some really deepwater structures and they were in negotiations with Heerema to build a big barge to carry them.

So by the time we got to Bullwinkle, the actual first bids on Bullwinkle were to allow the companies to either build it in one piece or two pieces, because there still were equipment issues. But Heerema was already entering in negotiations with Exxon for their Harmony and Heritage, which were like, 1,200 feet. They put in a bid saying, "We'll provide the launch barge for a one-piece." So that changed the technical issues considerably, and really, I think we learned an awful lot.

The other part that was in the area that I really got involved in it from certainly in the early eighties on, was on managing projects. We'd spent a lot more time really figuring out what one needed to do to effectively manage a project of this size, how to effectively engage the contractors. It isn't just a matter of contract administration; it's project administration and leadership, and there's a difference. We didn't have a large team, but we had a lot better and a lot clearer understanding of the requirements and the responsibilities of each of the major contractors, and we worked a lot harder at coordination efforts with them.

From a technology perspective, in some ways, to be quite honest, Bullwinkle was simpler because it was a single piece. Getting it onto the barge and taking it off and upending it and so on were still significant, but whereas Cognac, we had built them in three pieces and made sure they fit underwater, this was built all there in Corpus Christi in one huge piece, and put it on a barge and took it offshore and dumped it in the water. It was 1,350 feet of water. So it was a big animal. The base section stood 480 feet in the air on its side.

TP: Photos of that on the tow-out are remarkable, aren't they?

GS: Yeah, there's one in my computer room back there. So I think internal to Shell, other things that we had done, we were just so much better at schedule, cost control, things of that nature, but that's just because during the entire Cognac era. A lot of companies are like this; Shell is a company that is an operating and producing company. We didn't have very good systems internally on projects. There were ad hoc. They came along and then they went away, and they came and they went. So even to keep track of the things like costs and schedules and how much you need, you had to spend inordinate amount of time.

On Cognac, we had a three- or four-person team whose only job was to get the cost summaries from the normal part of Shell and interpret them for those of us who worked on the project, because they didn't make any sense to us otherwise. By the time we got to Bullwinkle, they had a lot better system, and the company had figured out we really need to know how to do project accounting as well as oil and gas accounting. So there were a lot of internal improvements.

TP: Was there a new sort of organizational structure?

GS: Well, just more recognition, they had the numbers. It was just a matter of how they were reported. I'm working away on Bullwinkle and I look back on it and there were a lot of things going on at Shell and in the industry. There was the downturn.

TP: You're putting a 1300-foot structure out there and the price of oil has collapsed. Was there some consternation about "What are we doing in this deep water?"

GS: No, at that point, at least not at the level that I saw. There may have been and guys like Mike, Pat Dunn may have seen a little bit of it. But by the time I was involved in '84, once we got going, there was never any question. "We're going to do this, right?" So I kind of look back over it and say—I had some other friends in other parts of the company that were not very busy or even concerned about their jobs during that timeframe. We had this relatively small group of Shell. The maximum we ever got up to was like sixteen people working on the project, and I think most of the time it was about a dozen of us. That was our job and we were pretty busy. So throughout this whole '84 to '88 period when things weren't looking so good, we were all very busy, and so were the contractors, like Kiewit.

But during that time, somewhere in there—and if you're probably talking to Carl at all, you probably already got this—while I was busy putting in the last really deepwater fixed platform, there were still lots of fixed platforms going out every year, but there's none of them out to that water depth and probably never will. That's when the floating systems were really starting to come along.

In fact, I wrote down this guy's name. He's not with Shell. I could chase him down. But if you want somebody to talk to about the tension-leg platform, which became the tension-leg platform, there was a version of it that was called the VMP, the Vertically Moored Platform. The gentleman's name was Ken Blenkhorn [phonetic]. He may have been with Marathon. I know we can find him for you.

TP: Blankhorn?

GS: B-l-e-n-k-h—I think it's h-a-r-n, or h-o-r-n. If you go on the OTC website, and you probably don't want to spend the ten dollars. In fact, I may have it. Some of the very original papers on what became known as the tension-leg platform were written by Ken Blenkhorn.

TP: We have them in our library too.

GS: He also was involved in the Arctic. He may have been with Amoco. Anyway, that's just an aside. He's still living, I think he's in Tulsa. We wanted to honor a paper last year at OTC that he had written. He couldn't come down because his wife is not well. I don't know how much he stayed engaged in that era.

Anyway, while I'm over here working on Bullwinkle, Carl and his guys were working at deeper water.

TP: From '83 to '85, they picked up all these deepwater leases, and the first area-wide sales.

GS: We used to fly back and forth to New Orleans. So then we brought Carl in. From '85 to '87, I think, my official office was in New Orleans, but my younger son was still going to high school and so I still physically lived here in Houston. So I'd see Carl on the plane. He had that East Coast operation. Then the question is, he was working on getting the drilling ready, but let's suppose we find something, then what in the hell are we going to do? So he had that whole team of Bruce Carlson [phonetic], and Claude Sellers [phonetic], and a lot of other guys working on floating systems, out of which, frankly, came the Auger tension-leg platform. That's where that all started.

When I finished Bullwinkle, I actually reported to Carl. He had moved over and taken over the project group over there. But anyway, he was over there. So they had done all this work on floating systems and they had looked at tension-leg platforms, and somewhere along there, Exxon had built the first compliant tower.

TP: The Lena.

GS: The Lena guide tower it was called then. It never was considered for Bullwinkle, but after Bullwinkle, we were going out deeper and deeper, 2,000 feet and so on. Peter Marshall did a big study on how we could build compliant towers. So when we got to the Mars, Ram-Powell, Ursa, we looked very hard at a compliant tower for 3,000 feet of water and the tension-leg platform. I don't think it was ever seriously considered for Auger, but I know it was for Mars

TP: Just as an alternative concept, or did you think that there was something better about a compliant tower?

GS: No, at the point that I got involved in it in the late eighties, it was just to say which one was cheaper. So we did this evaluation for Mars, and sometimes you ask, what is the water depth limit? Physically and technically, you could build fixed platforms a few hundred feet deeper than Bullwinkle, but financially and economically, it doesn't make sense. There are better solutions now. Compliant towers, there haven't been as many of those, there've only been a few, maybe a dozen, I think, at the most.

TP: This idea of SPAR or FPSOs were not even on the drawing board back then?

GS: Well, no, we never really looked at FPSOs in the Gulf of Mexico. But FPSOs had a longer history. I'd better check my dates, but even back into the early seventies, they'd been used off Spain. I forget the name of it [Castellon]. It was the early seventies. The idea of adding an FSO, floating storage, had been used off West Africa. I'd seen those back when I was over there in the early eighties. So for market-driven reasons, even in shallow water, it was pretty common off West Africa to moor up a large floating vessel, usually a tanker, an old tanker, because there wasn't any point in taking the oil to shore. The market was in Rotterdam or somewhere else, so they'd fill up the tanker and take it.

TP: They're mainly for export operations, you're not exporting in the Gulf.

GS: So while I was doing Cognac, Shell and the industry were doing a lot on floating systems, we were getting beyond the fixed platform. One of the options where a lot of research was done was this compliant tower, but that was still sort of like a fixed platform sitting on the sea floor.

Then the other option was floating, some kind of floating systems. Behind the scenes, Ed [Edward E.] Horton had been out there pushing the TLP. But this guy Blenkhorn I think even predated Ed.

GS: Have you met Ed?

TP: No.

GS: Oh, really? He lives here in Houston now. He holds a lot of patents on tension-leg and spar. He's from California, he's an entrepreneur.

TP: Was he with a company?

GS: Well, yeah, he formed his own little company and then he made deals with McDermott and others. Spartech is one of the things they called it. He had developed a concept and then patented certain aspects of it, whatever the Patent Office would allow him to do. Then he went to McDermott and he was with Technip for a while. Technip is now building a lot of spars. I don't know the

financial deal, but every spar that they build, to the extent that it relies on Ed's patents, he gets some money. I have no idea how much, but he lives here in Houston rather well.

But anyway, he would come visit us occasionally. I remember talking to him in the mid eighties. There was a very small company doing studies, that's how they survived. They maintained the intellectual property rights. He got the OTC Distinguished Achievement Award a few years ago for recognition for his work on was spar technology, I think.

TP: I think I remember that. I haven't really focused on looking at spars yet, but that's something we're going to do.

GS: I saw him again this year at OTC. If you need a contact, I'm sure I can find out how to find him.

TP: I know some people at Technip too. They probably can refer him.

GS: He may not be associated with it anymore, but he lives here in Houston. He looks healthy, but Ed's got to be in his late seventies, at least.

Anyway, there's a lot of work going on in floating systems. Ed did a lot these entrepreneurial idea things. In Shell's case it was "Skip" Ward and his guys who were doing a lot of studies. Companies like Shell and Exxon and so on, with all those vaunted technical capabilities, and they're substantial, once there is an idea out there, there isn't any group better at vetting it and understanding it and extending it and improving it, right? I've often wondered, why didn't we come up with the idea of the spar? Why didn't we come up with the idea of the TLP? But this entrepreneurial guy who really didn't even understand our industry that well, he's the one to say, "They're going to need floaters."

TP: Carl was sort of like that with the semi, although he was with Shell.

GS: He was with Shell.

TP: But he wasn't an oil guy.

GS: No, no, never.

JT: That's part of the big story of the oil and gas industry particularly in the Gulf of Mexico, so many outside influences. Somebody who opens up his own little small business for a small little service becomes something that the big oil companies eventually have to have.

TP: Although Carl was pretty adamant that Shell was one of the originators of the TLP idea. It seemed to come collectively in a way.

GS: Oh, yeah, it did. You're right. Ed may get a little more credit than he deserves, but he deserves a lot. He had the basic idea, but he could never have implemented it. There were too many details. Here are the basics, do this, this, this, this, and you tie it down. Fine, okay. Now we turn our Ph.D. and researchers loose on it and say, "Well, just how in the hell are we going to connect this to this?" Right? And those are the real, very, very difficult problems to solve. So I agree with that, but I give Ed a lot of credit. I have no idea where he generated these ideas, but I think they've done him very well financially. I hope so. He deserves it. If you want a story, you should really talk to him, because he lived through it.

Then, after Bullwinkle, I was personally named to be manager of what eventually became Mars. We hid it under some other name for reasons I no longer remember.

TP: You don't remember what the name was?

GS: No. I think it was just Project X or something like that.

TP: Lease number by number.

GS: Well, we actually had it at the time, so we did an evaluation of ways to develop it.

TP: Was this even before Auger was installed?

GS: No, Auger was being built.

TP: Was being built, okay. Evaluating Mars.

GS: Auger was being built and then we came back and said, "Well, okay." It was going along reasonably well. But here's this other option. What's the right answer? Ultimately, we ended up, as you know, with the tension-leg platform. But we actually looked at three major options. One was a compliant tower, the other one was the tension-leg platform, and a third one was an entire subsea development 70 miles back to shore. Nothing, no surface equipment out there, all the development subsea, brought back into the Louisiana coast.

TP: So one the platforms on the shallow water or just straight into the main pipeline network?

GS: Shell at the time had a facility for a lease bay.

TP: The central processing facilities.

GS: We even looked at saying we couldn't probably use that, because it was dated, but we could use the land and bring it back in there. I had three teams working on it, and we took it all, not to gross engineering detail, but enough to make cost and schedule and sort of risk estimates on it. I've learned over time that this isn't uncommon, that you have these three options, you do your economics on it and your risks, and they look a lot the same in costs. So what drives the decision then? The cost is a significant part if there had been big differences, but there weren't big differences. So the real reason for going with a tension-leg platform was that we did believe that the range of costs were narrower than for the other two options, so cost did play. And the other one was simply that since we'd done one, we know what we're doing. These others were starting brand-new again, and then finally we have a lot of people or will have a lot of people who will be trained to operate on this type of facility. So that's why we went with the tension-leg platform.

Then, once we did that for Mars, then I think to Pattarozzi's and Bob Howard's credit, they said, "Okay guys, that's a great decision. But now we've got Ram Powell, Ursa, and Brutus on. Why don't we just quit screwing around and say that's what we're going to do for a while and keep a little bit of study going on in the background." Because I always thought, as you build the first one, Auger cost this per unit, Mars cost this, Ram Powell, and somewhere out here it comes down. Somewhere in this region, somebody has a new idea, like a spar, perhaps. So somewhere in here you've got to get off that horse and start riding a new one.

TP: Also, the costs went down as the learning curve went up. The costs were made more palatable with the flow rates that you got coming out of Auger, right?

GS: Oh, yeah. Pattarozzi probably has told you the Auger story. That first well they completed was, what, 800 barrels?

TP: There was something blocking the formation, right?

GS: Yeah, as I understand it, in completing the well, the chemicals they used caused the pores to plug. So when they finally solved that—and I give Rich a lot credit—because that was a big deal and he kept his cool. He kept those production engineers working on it quietly, and it took about a month. They figured it out, went out and acidized it, then turned it on and it came in at 5 or 6 or 7,000 barrels. "Okay, we've got something."

So once we started down the TLP era in the nineties, after we had Auger, Carl and Chuck Enze, those guys, and then we had this hiatus of a year and a half, studying options and decided we were going to go with a tension-leg platform. From then on, the rest of the nineties while I was there, we just said, "We're going to continue to build TLPs for these leases." That basically had been bought in the

mid eighties, like you said. Mr. Flowers and those guys did us a great service. So we just said, "All right, we're going to learn." So we built them in the same places. We had different teams. It was a project management matter that we were working with over time. The hulls were built in Italy, the topsides were built in the U.S., and we just continued to do it.

TP: You stacked them up every two years.

GS: They weren't all the same because the subsurface wasn't the same. Mars was a certain size, Ram Powell had more gas and less oil, Ursa was bigger than either one of them, and Brutus was smaller again. I think it was Brutus. Anyway, we built four of them in the very same place with some companies over in Italy, and kept a lot of the same teams working together in the same yards. It was very successful. A lot of challenges, but still, it was a lot of fun.

TP: Contracting changed a little bit with Mars, didn't it?

GS: Yeah, it was interesting. Frankly, used to irritate me internally, that sometimes we were not listening very well to the contracting community. We had this almost adversarial at times, not always, but adversarial relationship with the contractors. Well, what makes us think that these contractors are S.O.B.'s? They're like us. They graduated from the same schools, they go to church or they don't. I mean, whatever, right? What is it? When they go to work for contractors, they're all of a sudden lying S.O.B.'s. That doesn't make sense. So we tried. We worked very hard, and Dan [Daniel] Godfrey and Lou Wilkerson and those guys who were working for me did a lot of the really hard work. We worked very hard to say, "We want to have a better relationship with the contractors."

The Auger guys, just to be candid with you, the Auger guys still think that we malign them because they thought they worked pretty well with the contractors. It wasn't that. That wasn't the point. The point was that instead of having project management systems where we sat here, the contractors sat there, and we passed things over and then we argued about it, we decided to put them together as a team. And it worked, it really did. I mean, in the modern era, we used to use terms like win-win, and that has fallen on hard times, but it worked. If you were willing to really work at it—

TP: Was that carried over into the subsequent projects? Ram-Rowell, Ursa, Brutus?

GS: Yeah, it really was. In fact, even today—and I know some of the guys there—some projects they just can't seem to do it because there's a host country involved, but there's still a lot of it, especially in the subsea. The subsea guys, we set up alliances with them. They still have those alliances. Yeah, that was a big, big, thrust. We really worked hard at it. Dan Godfrey—I think you've met him.

TP: We're going to talk to Dan next week.

GS: Okay. Well, he deserves a lot of the credit. He really does. He and I and a few others had these ideas. I don't want to leave the wrong impression, because, as I say, my friends from Auger, frankly—I may have to change some of the wording. They're, frankly, a little thin-skinned about the whole thing. It wasn't that we were being super critical of the way they had run it. We were just looking at it and saying that both companies, in that case it was McDermott, as well as industries, contractors, and the owners; we can do a lot better here. I think we understand each other, understand the drivers.

TP: They have a little more voice in the project from the beginning.

GS: From the beginning. If you want to have a discussion on that, there is a guy that helped us an awful lot, named Mike Cushman. I have his e-mail. But if you're going to be talking to Mike or to Dan next week, you might mention that, because he lives in New Orleans.

TP: Was Cushman with Shell?

GS: No, he was a consultant. What happened was somewhere along the way—he worked for McDermott as a sort of a management consultant. I've lost track. Mike was in the military for quite a while. In fact every now and then, during the first Gulf War, he just left because he was in the National Guard, and he retired as a pretty high level. Major, I think it was. Is that pretty high in the military? Something like that. A little higher, maybe. Anyway, he was a business consultant for McDermott, and we started this relationship management issue, and Mike ended up being the go-between. He helped organize the meetings. We learned that we needed I guess you would call him a facilitator. But he was more than that. But you needed somebody in the meetings.

TP: Not really from either side.

GS: Not from either side. It wasn't that we were arguing and fighting so much, but instead of having Dan trying to run the meeting, Mike would work with Dan, he'd work with the guy named Bobby Rahl [phonetic] from McDermott, who was the president of McDermott at the time. They'd set up what they were trying to accomplish, and then he would be there and manage the meeting. But Mike was more than just the administrative facilitator. He had the backbone to step up and say, in the middle of it, "But you guys, you aren't even getting close to the real issue."

JT: Is that the first time you all used kind of an outside mediator consultant for a big project?

GS: Yeah, at that level. Now, internally to Shell, during the nineties, we had been going through a lot more management courses and training and how to run meetings better and so on. So we had a small group within the company, and I didn't even know what they were called. They were high-blown names, but they were really meeting facilitators. We'd learned a lot about simple things like how to put together an agenda with objectives and all of that, right? I was looking back over it and I think probably the offshore group was better at it than most to begin with, but it was really helpful just administratively.

You've got a meeting. For God's sake, have an agenda, have objectives and what you're trying to accomplish, and get on with it. So we had that in house, but this was the first time I was ever involved with a real professional sitting between us, if you will.

I still do some consulting for companies. What intrigues me about this, it's life. I'm getting old enough, I mean, it's just human nature. Project management, when I started, was all about what I would call the mechanics, cost and schedules and how do you do it. Hell, the first time that I did one, it was the back of butcher paper, by hand, laying out the cost or the schedule. It was called aero-diagrams or pert-diagrams. Well, you've got a gazillion ways of doing that, Microsoft Projects has one now; you just put it in and it will do it. So there's sort of the administrative, getting the details, but over here, it's the leadership and the relationships. And I don't mean just going and having a beer and so on, but really understanding, why is this project working for Shell? What are your drivers? What are you trying to accomplish? What are McDermott's? Then you sit down and say, "Okay, here's the deal. Here's the contract deal. Now, it ain't all going to work that way, so how are we going to solve these problems when they arrive?" That was the kind of meetings. Again, if you're going to talk to Dan and you've got the time, get him to talk about that.

TP: I will. The other thing about Mars is BP. Now, was BP involved in this whole new kind of relationship with contractors? Shell was still the operator.

GS: We were the leader. BP, at the time, when the exploration people made these deals, part of the contractual arrangement was that a partnerships had the right but not the obligation, to have as many people on the project team in ratio to their ownership. So if you had a project team with twenty people, BP had roughly 30 percent, 28 percent, they had the right to have six people. Same thing with Ram Powell and all the rest of them. Well, they didn't exercise their full right. They didn't have to have their percentage. They could have one, or none, or whatever. They exercised it up to a certain point. BP had three or four people, and on Ram Powell, Exxon had some people.

So we would integrate them. It was our choice as to how now are we going to use these people, because that was left unclear in the contract. We chose to just say, "All right, you've got good people." Actually, on one of the projects, not on Mars, but on Ram Powell, the project construction superintendent was an Exxon guy because he was more capable than the people that we had internally to offer up. We led all of these kinds of discussions with McDermott. They didn't disagree. In fact, a lady, Judy Wagner with BP is part of the story. Again, if you're interested in sending an e-mail, she's retired now.

TP: Judy Wagner?

GS: Judy Wagner. She now lives up in the Boston area. In fact, she might be worth interviewing, because after Mars, she was BP's project manager on the spar. I think it was called Holstein. Then after that, she finished her career with BP as manager of BP's Project Management Academy, they call it, BPA, BP Academy. That was done in association with MIT, worldwide. So she was up at MIT running that for I don't know, three years. When she retired, it turned out they loved it up there, so they just stayed.

TP: Wagner, W-a-g-n-e-r?

GS: Yeah. She retired, but I have her e-mail.

TP: I'll follow up with you. We need to talk to BP folks.

GS: I lost my contacts with the local people, I've been retired almost ten years, eight years.

TP: I know Dan is very active. We can get names from him too.

GS: Oh, yeah. Dan retired about 2003 or 20004. After he retired he basically went right back to work for Shell for two and a half years on a consulting arrangement. Now he's working for Williams Brothers. With Shell, he worked basically full-time for at least a year and a half and more than half-time for the next year. Now I don't know what he's doing with Williams. He's maybe 60 percent time there.

Anyway, you're right, the whole issue of we can do projects better if we work more effectively with the contractors. I still believe that and I think we did the right thing. It saddens me that some of my friends—and they're still friends—from Auger still think that we treated them badly.

TP: They had some problems with contractors at Auger, right? There were overruns with McDermott, then there was a strike on the Heerema barge that was loading up, I think, the base section or something, and you could try to anticipate things well before any of this happened.

GS: The reality was that McDermott had underestimated the complexity of building that deck in Morgan City. I think at Shell, technically we had as well. Contractors weren't being dishonest in the sense that they decided to give a low price or anything; they were just wrong. Then it's kind of miserable when they come back saying, "Did Shell change anything?" "Well, yeah, we only changed a little bit."

TP: Well, part of the reason for moving to this new contractor relationship was not only to work more closely with them, in more cooperation, but put a little more of the burden on them in case there are cost overruns. Aren't they more responsible? Some kind of formulas that you developed–

GS: Yes, we raised that with them. My view was that we wanted, to the degree that we could, the absolute, very clear understanding. When you give us a price, what are you talking about? Some of them were at a stage that they couldn't be that clear. Dan did a lot of work on this in saying, "All right, then, here's a process so that we agree this was a murky area. Here's our process in the future that we're going to determine how to calculate the fair value, the fair cost."

Part of it, again, is that this was one of the contractual deals. We set it up, and I think it worked. You've got to ask Dan's view. I think the basic contract with McDermott worked pretty well. I don't think we had it in the one with Belleli building the hull, but the basic contract was that we would work together to try and improve the building of the hull or the deck. So here was our best estimate, which we jointly agreed on. Any improvements on that, we got to split. In other words, I don't remember the numbers anymore. Dan will, probably, but in McDermott, the estimate was going to be let's say a million craft hours in building this thing. So, if by working together, we could cut that down to 800,000—I don't remember what the numbers were—McDermott would get paid for 100,000 of those hours that they didn't do anything.

TP: I see. There were incentives built in for improvement that probably weren't in the old relationship.

GS: But more than that. So those were the kinds of things that were in there, but more than that was these monthly meetings. They got a little testy at times, but the point of them was to really understand what was driving each of us. It's true, certainly friendships developed. I think we're all still pretty good friends with the McDermott president at the time, a guy named Bobby Rahl [phonetic]. Bobby's very, very sick. Bobby's got Lou Gehrig's disease right now, which is pretty sad. But we were all became very good friends, but professionally, right? We could go play golf with Bobby on Thursday and have one of these meetings on Friday and get really testy, but within the confines of "This is how we agreed to solve these problems," right? Whereas in previous projects you just say, well, there wasn't any thought put in in advance on how we are going to negotiate, because

we are going to disagree. I look back on that whole era and say it was a success. I mean, we treated the contractors fairly. They understood what we were doing. We understood them.

TP: So do you think it's still the way it's done now? Has this model of been disseminated through the industry?

GS: No, unfortunately. In my view, not even within Shell. But it's a lot easier. I think the end result is better and the projects are better.

TP: To keep this at arm's length is just easier. It's the established paradigm.

GS: What happens is that it depends on the financing. If you have majors like Shell and BP and so on, that fund the whole thing, then they set their whole rules. If you're going into the international market, like Nigeria or so on, where so much of the financing, even if it's provided by the majors, as it is, is ultimately backed by bank systems or the country. The host government sets the rules, because eventually they see it, and even though Shell and BP and Exxon front the money, that it comes out of them. Eventually they pay it back slowly over time. They have rules.

In the big structure that Shell just finished off West Africa, Bonga, it was very difficult to establish really good working relationships because of the imposed rules. If you sign up with a contract that says my fault, your fault, his fault, nobody's fault, Jason pays because he agreed to build this. And he did. But now that he looks at it and says, "(*a*), I was absolutely honest and I didn't understand it and they're going to put me out of business," or, "(*b*), I'm an honest man and you have come in with twenty-seven changes that you say aren't going to affect anything." I mean, that's nonsense. I think some of it has stuck in some areas, but not as much, in my personal opinion. I think some of the people that worked for us, some of the younger guys that are still with Shell use elements of it. Chuck Enze left Shell.

TP: I've never talked to him, but I've heard his name enough.

GS: He's building coal plants for TXU.

TP: Oh, really.

GS: Just last week I went up and spent a day with him.

TP: Where is he?

GS: He lives in Dallas now. They're building these coal plants, there's one up near Centerville, Texas and there's another one somewhere. There are three of them

that they're building. But some of the philosophy that we all developed and Chuck was a part of is finding its way simply because he's got the authority to try it.

TP: That's one of many reasons we chose Mars to feature in this research. This contracting law is one thing I'm interested in. The newspaper accounts at the time are saying, "Wow, this is a real interesting new thing that's being done." It's the project where BP got its introduction to deepwater. It was a dramatic improvement on Auger. The story about the leases and the geophysics, it's a real interesting story. So it's got all these facets. Then it was damaged in Katrina, great recovery. It's got this incredible history.

GS: That's right. It blew the top off.

TP: But we'll talk to Dan more about this idea. I think it's a good one.

GS: He wrote at least one or two papers on the topic. He gave one to the Deep Oil Technology in The Hague one year and he may have had an OTC paper as well. Have you met Dan?

TP: Yes, I met him at the Galveston reunion.

GS: Because he's chair of the Galveston reunion.

TP: I mean the last time I was there, which was a few years ago. But he lives in Heights, a couple blocks away from me.

GS: Oh, really?

TP: We've set up times and had to cancel in the past, but we're actually going to do it next week. So now just to conclude all of this, when did you officially retire from Shell?

GS: The end of April 2000. For the last eighteen months sometime in '98, my title had been Manager of Deepwater Projects. Then I was planning to retire, so I was moved to Manager of Strategic Relations. I love that title. In fact, I still have some of that stuff around. The idea was that I was going to spend a year trying to capitalize on all those four years of relationships and say, "All right, how do we formalize this and institutionalize it?" Because I was going to retire sometime in '99. I was working directly for Pattarozzi and I didn't have any staff at that point. Mahdi Hassan came in as the Manager of Deepwater Projects to replace me. We did a few things, and then Mahdi got there and it made more sense for some of the stuff I was doing to get done by somebody who was directly involved with real projects.

Somewhere in mid ’98, we finally thought up the idea that this whole issue called Y2K, while we didn’t understand it, we understood enough that we’d better be doing something about it. I read a lot, I always have, and I had been reading about this thing, and I got some stuff and I went to one of Pattarozzi‘s management meetings and just brought it up, said, “I don’t know whether to be worried about it or not, but some people really are. Are we doing anything?”

So Rich went to one of his meetings with Jack Little et. al., and I guess Jack said, “I guess we’d better start doing something about it.” So he came back and said, “Yeah, we’d like you to look into this more for us.” Then we said, “Better set up a small team.” So they came to me again and said, “All right, will you run it on behalf of Shell U.S. E&P [Exploration and Production]?” And I said, “Yes, I will, but I’m still going to retire in late ’99. So if that isn’t a good enough deal, don’t give it to me.” They said, “No, that’s fine. We’d like you to go to Houston to run it.” Which for me was a good deal, because as much as I love living in New Orleans, I was never going to retire there. It’s a great place to be for a while, but it had incredible issues. It wasn’t going to be where I was going to live. So I thought, that’s a good deal and I’m going to work for nine months. Well, they knew me very well. Once I got involved in it, I couldn’t let go of it. So I stayed until the end of April.

As an aside, it was fascinating. We went through all our computer programs, we worked with all our vendors, we went offshore and checked all of our date-type equipment, and we found stuff. I mean, we absolutely found stuff. People who did nothing didn’t seem to have any problem, so I don’t know. I’ve been asked more than once, “Do you think it was worth doing?” My only answer is, as a responsible company, we couldn’t really do anything else. But I don’t know. We found stuff in our financial computer systems that would have failed. But maybe it would have taken a week to solve and so who would have cared, perhaps? But it would have been a crisis at the time, but we’d have lived through it.

TP: So you were sort of overall manager of deepwater projects, which included Ram Powell, but you weren’t directly involved in each one to the extent that you had been involved with Mars.

GS: For Mars, I led a team. I guess I was called Manager of Planning or something of that nature. I led a team and we did the study on tension-leg, compliant tower, subsea. Then when Carl retired, he had the title of Manager of Deepwater Projects. So Carl retired and I was made Manager of Deepwater Projects. Dan, who had been in Brazil, came in and became the manager of Mars. A guy named Lou Wilkerson had already been working on Ram Powell. Then when Ursa came along, they put Bob Jeffries [phonetic] in charge of that and Doug Peart worked for me on subsea. So I inherited Peart’s subsea business. Carl retired about ’93. From ’93 to ’98, somewhere in there, I was the manager of the deepwater projects. So Dan and Lou and a guy named Jeffries and Doug Peart and for a

while I had other Shell deepwater groups working for me too. For about a couple of years there I had eleven people, eleven organizations, but the main ones on the deepwater were these guys.

TP: One other question I have is how interested was the group, or how closely did you work with the group Royal Dutch Shell? Once deepwater became what it was in the mid 1990s, was there a lot more interest from London and The Hague, or The Hague people over there? Were you having to sort of tutor their engineers on what was happening in deepwater?

GS: Yeah, that's a good point. There was more and more, not in the sense, Ty, of directing us or managing us, but in the sense that I remember almost every so often—and Rich probably got tired of it—we'd be hosting somebody. We had a bunch of Norwegians come over one time and we took them off to I don't know whether Auger or Mars. And we had people from Nigeria. In fact, at one point—when would that have been? In the mid nineties, we had a guy come in from Nigeria and spend a whole year with us. He officially reported to me. That was just simply to have a place to report. He just roamed. We sent him offshore. He was a very senior guy. He went back to Nigeria, he was either the managing director or the assistant—not of the entire Nigerian Shell Company, that's huge, but of this new offshore, separate offshore company that they set up, which has become pretty big.

So, yes, there was a lot of interest starting there. Here we had this guy coming and Ludie [phonetic] came over, spent a year with us. We had quite a few visitors. I remember the Norwegians, I remember people from Nigeria, and often, especially during OTC week, we would have people from Shell U.K. or someone. That would be more ad hoc.

A lot of it was driven by Shell International's effort to persuade some of these national governments that we really knew what we were doing and we could go out in the deep water, and the example was the Gulf of Mexico. Chuck was over here running the Civil Engineering Group at the time. I think he actually made some trips to the host countries representing International Shell. They didn't know how we were organized internally and they didn't care, to them we were just Shell. So here's what Shell can do in the deepwater.

Same thing with that whole Sockolit [phonetic] deal. I was never personally involved in that, but that went all the way back to Pat Dunn for a while. That was on the books for a long time.

TP: Were you ever over in the North Sea or did anything in the North Sea?

GS: No.

TP: I'm wondering how that technical expertise in the North Sea and the Gulf influenced each other and Shell. It seemed to be all sort of a separate.

GS: Back in the seventies, Dan spent a year or two over there as a young engineer. My approach when they started developing in the North Sea was that the equipment and technology from the Gulf was taken over there. Then they found the wave conditions routinely, I mean in the Gulf of Mexico, is actually pretty calm, except for hurricanes, whereas the North Sea is actually pretty rough a lot of the time. So, yes, there was a lot of technology that come from the Gulf and then they realized that some of it would work and some of it wouldn't. The Dutch and British and Norwegian engineers really came to the fore. I mean, the whole concrete tower concept came from there because the thick steel platforms were too difficult to install, and things of that nature.

So, yeah, there was a lot of sharing from the U.S., and then as the North Sea people developed their technology, especially in floating systems and things like that, it boomeranged all around the world. They had had as much impact on developments in the deeper water areas as we have, in some ways. Tension-leg platforms and spars are really Gulf of Mexico, even though physically the spar hulls are built mostly in Finland and the TLPLs are mostly built in Korea, but the technology for those was really developed here.

TP: That's another topic we've run into. We're doing another study on Gulf Coast shipbuilding and fabrication, and a lot of it leads in the eighties, or maybe even before that.

GS: In fact, one of the issues for the construction companies now is how willing are you to go to China? Because that's the cheapest place to get things built, but the quality isn't very good yet, apparently.

TP: Singapore.

GS: Singapore still builds a lot of things. The U.S. really hasn't been able to compete in that except militarily, I guess. The U.S. military still keeps that shipyard in Pascagoula. It makes sense for country reasons, but not for companies.

JT: I was curious about the pipeline system from Mars. I didn't want to interrupt you while you were talking about that transition from the fixed platforms and then to the floaters. One of the questions that I have for you and kind of have in general, is, what role does the pipeline system play in all of your planning and your analysis of costs, etc.? And specifically with Mars, what were the challenges of 3,000 foot of deep pipeline, and where does the product end up?

TP: And if you can direct us to anyone else we should talk to regarding pipelines.

GS: Yeah, okay. Well, first of all, I keep mentioning his name, but Dan [Daniel] Godfrey, seriously, because interestingly, after he finished Mars, he went overseas for a couple of years, working internationally. Then he came back to the U.S. and he left E&P [Exploration and Production] and became the manager of Shell's pipeline group.

But on the Mars, its pipeline was a very interesting issue in itself. It was a long way out there, so we brought it back, crossed over an existing platform to build up and added pump on to build up the pressure. Then it was taken into one of those salt domes in Louisiana, as a storage dome, and then it was pumped out of there. The Mars crude was not the greatest. It had a high acid number, so it actually had a deduct on its value because of that. But you know, refineries, so they had to blend it into their other oil.

By then it wasn't the first time that a pipeline was put in 3,000 feet of water. Auger already had pipelines coming in. But, yes, it's very, very important, and that's one of the design requirements. What do you think you're going to produce? This whole business, Jason, it's rather fascinating to me, that if you talk to the geology and reservoir people, they're doing the absolute best they can do because of the nature of the data they have to deal with. They've got this range, this bell-curve range, there might only be a 100 million barrels of oil, there might be 400 million, our best guess is 300, let's say. Right? That's it. So you make some decisions and you go ahead.

Well, by the time it gets to people like Dan and I and so on, we're build things out of steel. So you've got to decide, is the pipeline going to be 18 inches or 24 inches. I mean, this isn't philosophy. It's going to be a hunk of steel. And once it's that size, then there's only so much that can go through it.

So the production at Mars was scheduled, it was designed to be a 100,000. Dan will probably know more than I about the history behind what we decided on the size of the line, because eventually I think we were putting well over 150,000 barrels through Mars. And the only way we could have done that is if there's a pipeline that can take it away. It was a long line. That one was probably over 100 miles from Mars back to its final place where it went in.

So as part of the overall economics, no matter how you calculate. Sometimes, internally, the process would be we and E&P [Exploration and Production] will build this and you, Pipeline, will build the pipeline. Well, fine. Then you still have to do the economics based on the entire system. Right? Now, we may do ours and they offer us a price for the oil so we calculate this part and they've calculated that part based on what they get for the oil and so on. But however you do it, this floating system, that 100-mile line and all the rest of it has to be included in some manner in the cost. It was a challenge, but by the time we did it,

it wasn't as though 3,000 feet was the first time it'd ever been done. Auger was close to that.

TP: What size was it? Was it 24-inch?

GS: I don't remember. Dan will know. I would guess it must have been close to that, because as I say, I think we put well over 100,000 barrels through it.

JT: Was it McDermott who laid it?

GS: Ask Dan. I don't remember. Could have been Allseas.

TP: You had to expand the capacity of both of those platforms, right, or at least that of Auger?

GS: Yeah. Auger immediately, almost immediately, and Mars as well, because Mars was designed for 100,000 barrels. Well, by the time you design equipment, and what do you mean by 100,000 barrels, sometime later in life when there's more water and so on, but if it's brand new and mostly oil, then just the nature of it, it was never 100 specifically. But as soon as Mars came on and we were seeing the productivity of it, one of the first things they did was go out and de-bottleneck, just go through and find spots and change valves and so on. The facilities engineers, as we call them, had done a lot of thinking about designing for 100,000 barrels. I think Jay Smith used the term "backbone" or something. What can we put in here that allows some flexibility without costing much money? Dan will probably know the number, but my recollection is that they got up to at least 150,000.

TP: Yeah, I think so.

GS: Without too much delay, either. Does that answer your question?

TP: Yes.

GS: Ask him. I don't know who installed them. It might have been a company called Allseas, it might have been Heerema, or it might have been McDermott. I don't know who put in the pipeline.

JT: Was most of the crude refined by Shell or Norco facility or was it sold off?

GS: What happens in this business is that we buy and exchange oil amongst ourselves.

TP: You mean that gas we buy at the Shell station isn't all Shell oil? [laughs]

GS: I don't know what percentage. I do think a lot of the Mars crude did go to Norco. I think so, because I remember at the early stages having these discussions, because part of the issue with the Mars crude was this—the term is "acid number." It's got certain corrosive elements in it that the refinery has to deal with. It wasn't a problem for us in terms of materials and things like that because it's not at the temperature, but when they're trying to refine it and get it to higher temperatures, these acid components come out and chew up metal. So if the refinery isn't designed to take this kind of stuff, it can be pretty tough on the vessels and so on. So I don't know the answer to that. I suspect a fair amount of the crude of Mars found its way to Norco because of the discussions, but I don't know.

JT: The gas, I assume they built a parallel gas line?

GS: They built a pipeline and I don't know where it went. The Gulf of Mexico has built up over the years this incredible infrastructure of pipelines. In the Mars case, I think we built this line all the way back to St. James in Louisiana. Yeah, because I know Dan had all kinds of issues. Building a line offshore was issue-free, sort of, in terms of any politics or anything, but once you get on land, with landowners and all the rest of it, he had more heartache building the land portion of the line than the offshore line. I think the name of the place it went into was Shell's St. James Terminal. I think it was something like that, which was a storage salt dome. You know what salt dome storage is?

TP: Yeah.

GS: It was a salt dome storage. I don't know, ask him, I'm getting old and forgetful. It may have even been a new one. They may have even created a new salt dome to put this in, I'm not sure.

TP: Is there anything to say about the hub concept as it evolved or was implemented initially? I talked to Carl about that. You design these TLPs to eventually take production from the surroundings. That was one of the considerations, right? How much of it was where you sort of had foresight to see that these would be hubs that could take production from other fields as their own production declined?

GS: Well, the idea was there. In fact, I'll go back to Bullwinkle briefly. In some instances, it cost very little to do it. Bullwinkle became a tremendous hub for a couple of reasons. One was, it didn't cost that much money. We would put in what we called pull tubes to put in pipelines, J tubes or pull tubes, and relative to the cost of the structure, it was a very minor amount of money. The other thing was, at the time that we built Bullwinkle we thought, from a geology point of view, that we were going to need 60 wells. So we built this huge deck, equipment and so on, and we were going to produce 100-and-some-thousand barrels. Well,

we produced 100,000 barrels all right, but we only needed 25 wells. So there was space.

So over time, other subsea facilities have come in there and they could get there because we had these pull tubes in which they could put flow lines and pipelines, and you had the space to accommodate it. So it became very, very profitable in that sense. So there was a certain aspect of Bullwinkle where it was planned. We built in a few extra pipeline accommodation pull tubes.

Now, when you get to Mars, Ram-Powell, Ursa, you start making some costly decisions. The cheapest thing to do is to put on what they call riser baskets. They're just places that somebody can come, you know how many you need, or you think you know how many you need for your system. Mars had a lot of wells directly under it and we had a few subsea wells coming in. Same with Auger. But it was relatively inexpensive to add the capability to bring in more subsea wells by putting on these subsea flow-line riser baskets. So that would be the first step.

Now, the question then comes, well, you may need more space. Well, if you need more space, you need more buoyancy in the hull, and so it starts to cost more money. So each time we would face this, we would call it pre-investment. How much are you willing to invest, because there's no guarantee, on the chance that somebody will come to you or you will find a field close by, yourself, and say, "This is the kind of deal we can make because we've got all this space and weight capacity available"? So most of the TLPs, I think, now have become hubs in that sense, because they did have a little bit of extra. In some cases, life isn't as great as you think it's going to be. I think one of the ones out there, maybe Brutus—

TP: I think it's Brutus, yeah.

GS: So if there's anybody around that wants to come into it, they're more than welcome to because we aren't filling it up ourselves.

At the time, Ty, we'd go back and forth. The internal dynamics were that the project itself—pick Mars. BP owned 28 percent of Mars, and so if you looked at it strictly from a Mars perspective, then Shell might be willing to say, "We'll spend a few extra million here just to provide these capabilities." BP might say, "Well, we aren't interested. This is Mars, right?" So it was always those kinds of dynamics.

Now later, after I retired, there was Perdido—no, that's the latest one. Na Kika. Na Kika is a floating system—

TP: With a bunch of subseas.

GS: A bunch of subsea. Where Na Kika is—here's the floating system. Right beneath Na Kika there's no oilfield. The closest one is a few miles away, I don't know how far. It brings in six different fields coming into this floating hub and they're not all owned by the same percentages. Shell owns a certain part of this one and so on and so forth. So in that case, I know from talking to the project manager, Bill Ludes [phonetic], that there was a lot of internal and external negotiation over what the size of that thing was eventually going to be.

Perdido is a spar that just went in for Shell, and the same kind of thing because there's, I think, three or four different fields coming into it and they're not owned in the same percentages. Shell has a certain percentage of this one and less of that and more of that. But the philosophy behind it is that at some point, however you finally arrive at it, however the partners finally agree on it, at some point it always comes up, how much do you need for the projects that you know and how much are you willing to spend, to pre-invest speculatively, if you will. Maybe with a pretty reasonable likelihood, but still not certain, how much are you willing to spend? The answer is, it varies depending on the circumstances.

TP: How willing are the partners? It depends on the project?

GS: It depends on the project. My relationships or the ones I was involved in, we didn't push it very far. We mainly did things like add—they were pretty cooperative, but, on the other hand, we weren't spending really big money. You might ask Dan. Again, he was the project manager on Mars. On Ursa, Ram Powell, yeah, we added what we call these riser baskets. It added up to a few million. That sounds like a lot of money, but we were talking about 600- and 700-million-dollar projects. So you might add in three or four extra riser baskets just in case. That cost a million and a half or something, I don't know.

TP: Were other parts of the company saying, "We've got to think strategically about this?" Or was this really sort of a decision you made in your group alone?

GS: No. On the Bullwinkle one, there was a different timeframe. On the Bullwinkle one, we just did it. The project team just did it. We had the task of agreement of the division manager. It was one of those, if we go ask, we'll be arguing about it for months. Why don't we just do it? By the time we got to the floaters, there was more money involved, and so on. It was really not a project. Dan couldn't just do it. His job was clear. "Build this. This is for Mars." I'm sure he was involved in the decisions, in the discussion and the decisions, to say, "Well, what if we want to add more?" Then his team would look at it and say, "Fine. You can do this and this is what it's going to cost. If you want our opinion, then fine, here's our opinion."

But eventually, little stuff, I suspect, adding a few riser baskets, I think is the terms they used, was a pretty easy decision, saying, "Well, wait a minute, we'd

like to make the deck another 2,000 square yards," or whatever number, make it ten feet longer and twenty feet wider. Then the answer, "Wait a minute. It's starting to cost some real money now." Finally, if the company wants to speculate on that—I don't think we ever really did that. Generally you need a little extra anyway. You're never that certain.

JT: What was the final price tag on Mars, thereabouts?

GS: Dan will know. It was in the 550 million range, but I don't know.

TP: Much less than Auger.

GS: Yeah, it was. I don't know whether that included the pipeline or not, because the pipeline would have been—I bet the pipeline was in the 100 million range, maybe even a little more. It had to be. It's pretty long. The entire development, if you add in all the wells and so on, was probably a billion. You probably hear that TLPs were like billion-dollar developments. Well, they were, counting all the wells and the drilling and the flow lines and pipelines and subsea.

JT: The leases.

GS: Because the way Shell was organized at the time, and I think it still is, was we worked closely with the drilling guys, but that was a different project. I didn't manage the drilling, that was somebody else. We built the facility and the drillers drilled the wells. Then we connected them together. So my number is for the facility. In round numbers, it was over a billion dollars. I think the part that Dan managed was around 600, 550, 600. A lot of money. And the irony of it is that twelve years later it'd probably be three times that. Just blows my mind. Four times, maybe. Incredible. I don't know why.

TP: It'd be hard to be doing cost estimates in these last couple years. We've got 147-dollar barrel down to 30, now back up to 66. Where's it going to be this time next year? I mean, who knows.

GS: I agree. We used to look at the development costs from 5 to 6 dollars a barrel. That meant if you thought there were, say, 250 million barrels in there, it's kind of simple because it depends on how fast they come out and the value of money and all that. But a kind of simple approach to it was a development cost of about 6 dollars a barrel or less in the nineties, that's what we were trying for. Now, Mars was a good deal because it was like 500 million barrels, so its development costs were like 2.25, 2.40. It was about 2.40, I think, 1.2 billion hauled in. But the lease bid and the development for the exploration wells and the development wells and so on.

Ram Powell went about 250 million barrels and it cost a little more, so it was like 6 dollars a barrel. Still a good deal if you're making 12 or 14 dollars, or 15, whatever we were making at the time. I read somewhere that companies were saying they needed 58 or 60 dollars a barrel to have enough money to invest in continuing. I just don't understand it.

TP: When you get out into the lower tertiary, you've got subsalt stuff; I guess wells can be 200 million dollars.

GS: Well, that's right. Transocean just built a new drilling rig for 900 million dollars. This rule of thumb is you divide the costs by 1,000 to get a rough day rate, so they have to get 900,000 dollars a day to amortize that thing. So all of the sudden you've got a million-and-a-quarter dollar-a-day operation, at least. And if you're out there for 100 days on one of these deep wells, which is not uncommon, 200 hundred days, all of a sudden, you've got 250-million-dollar drilling costs for one well. So the finding costs have gone up.

You're right, Ty. When I teach my course every now and then, they think I'm an expert, so they'll say, "What would a TLP cost?" I don't have a clue. I do some consulting, but I don't do that kind. I do kind of project management, organizing, how do you get things done. I don't see much cost data anymore, so I really don't know. Any numbers I would give would make no sense. My experience was in the nineties; we could do it for 6 dollars a barrel. But you obviously can't now, because if you could do it for 6 dollars a barrel and make 60, you wouldn't be complaining.

TP: It's a whole different world, I guess. Do you have anything else you think we should know?

GS: Well, I hope some of this is useful to you.

TP: Extremely, yes.

GS: Are you interested in, at this point, in subsea?

TP: Oh, yeah.

GS: Who have you—

TP: Well, Ron Gere [phonetic], mostly, but if you have names of people who have more experience with recent developments in subsea.

GS: Another early one that would give you some perspective, sort of historical on relation to the one-atmosphere chamber that we manned, would be a guy named Finus Martin [phonetic].

TP: He was part of the original Rudac team.

GS: You know Ottoman [phonetic]?

TP: Lloyd. I've talked to Lloyd.

GS: For the last few years, there's a guy at Shell, still working there, named Doug Peart.

TP: Peart?

GS: P-e-a-r-t. So far as I know, he's still working there. You want sort of a "where are we today" kind of perspective because he's been head since 1995, '94, '95, somewhere in there. Doug came to work for me as head of a six- or sever-person subsea group, and we had this vision of building it up. He now has 150 people or something of that nature.

TP: So he heads up subsea.

GS: He works for Robert Patterson and he heads up Shell's subsea.

TP: How about Charlie Williams? Do you know Charlie?

GS: Yeah. He'd be worth talking to, in general, but he's mainly a production engineer. If you wanted stories or understanding of, for example, this whole Mars or Auger well issue, using that as an example, I guarantee you Charlie would know the ins and outs of that. Bob Helmkamp was working on it. We built the Mensa subsea and then the damn thing came apart, almost, and Charlie was up to his ears in solving that problem.

TP: Doug Peart, that's another good name.

GS: Doug's still working there. If you want to talk to him, let me know. I don't want to scare you off or anything. He's a really good guy. He really is.

TP: I find the guys who are still working don't have a whole lot of time to sit down and they're sort of constrained on what they can really say.

GS: But if you want to talk to him, let me know, and I'll call him up and tell him. He used to work for me. I love the guy, literally. He was tremendously capable and at times he could be so stubborn and difficult. So I can still call him up and say, "Doug, damn it, would you get a phone call?"

TP: Charlie knows we're working on this and I've had a lot of discussions with people.

GS: I'm trying to think of the subsea guys that were involved that are retired. I'm just drawing a blank.

TP: Well, Ron Gere [phonetic] might be able to put us onto some people who came up under him.

GS: Yeah, for the history part. Peart, since he's been involved, I think he'd be worth trying. I didn't mean to scare you away from him. He's a good guy. But since his role from about the mid nineties to now, now that I think about it, he's expanded and he's got promotions and he's now a GM level in Shell and all that, but in some ways it's the same job. He used to head a team of six when he came to work for me and we were really proud, by the time that I left there, that we'd built it up to eighteen. Then when I got out of the way, he built it up to a 100-plus. He lived through it, he understands where we are now and how we got there and the whole relation internally within Shell. I think we got along reasonably well, but there was kind of an interesting—

TP: Friendly competition between the platform guys and the subsea.

GS: Yeah, that went on for years, but at a certain point, I remember Peart saying to me one time, "Is this a subsea project that happens to have a floating hull like Na Kika?" All these subsea wells and they come back to this floating thing. Because the big project was the hull and the topsides and all of that, like Mars, and had a few subsea wells. Ram-Powell had a few subsea wells. Well, Na Kika is the reverse. It's entirely subsea with this floating dock in the ocean. Doug used to say, "Subsea guys are getting tired of working for you topsides folks. You're going to work for us. It's our project and, by the way, get that damned thing ready, because here we come." He's a good guy; don't misunderstand me.

TP: Well, that really is sort of a trend. Petrobras is now putting FPSOs out in the Gulf, and even spars, I guess.

GS: Yeah, well, Perdido is a spar down near Mexico. The Norwegians—Norman Longe [phonetic], I think it's called, have a subsea development that comes all the way back—it's either 130 miles or 130 kilometers; probably 130 kilometers. So there's a complete subsea development, no surface-piercing structure out there. It all comes back to an onshore location in Norway. We probably will get there here. It depends. The interesting issue now is if you talk about hubs, you've got this entire infrastructure out there. Just like having it in the North Sea, after you get the main infrastructure thing set up, then people start finding a 50-million-barrel oil field or a 30-million-barrel oil field. Well, it makes money now because Jason's already built his structure and it's sitting there, and he's quite willing to

do business with you. So there's a lot of that going on. But every now and then you find one that's just a huge independent development, like the one that Shell just did or are still doing. The spar down off the Corpus area is entirely subsea.

TP: Great White, I guess it's called. Now it's pronounced Perdido.

GS: I think Great White was the name of the field.

TP: This gets to an interesting question that I'm looking at, is the relationship with Mexico and the transboundary resources, if they're discovered in that little area that they haven't quite fully resolved yet.

GS: I don't know. I used to occasionally see somebody come in—these lease lines in the Gulf of Mexico, they'd show the oil field and it'd just stop. Isn't that fascinating? Isn't that fascinating? That sucker just [demonstrates] right there. Well, and we didn't know—they knew something about it, but they weren't willing to show it to anybody because they were still interested in this lease, or maybe that lease belonged to—

TP: Somebody else.

GS: —Cognac. I mean, we had three leases and Amoco had the fourth. Amoco?

TP: Amoco, yeah.

GS: So we ended up negotiating a deal with them, finally. The base section was on the barge heading offshore.

TP: That's right.

GS: I don't know who made the deal. Paine, Sam.

TP: Sam Paine. I talked to him about that.

JT: To buy the lease from him?

TP: Well, Shell had three leases, Amoco had one. Shell developed a way to put a platform in. Amoco doesn't have that concept yet. So Shell was going to start producing in that field that they both had leases so Amoco really had to come to the table then, at that point.

GS: Yeah, because we can't drill down into theirs, but there's absolutely—in the way the business ran, it was absolutely allowed and ethical and everything else to put a well right there.

TP: Right on the lease line, right next to the lease line.

GS: So if some of the oil over here that belonged to Amoco happened to find its way in there, well, you know, that's life. The government, MMS and so on, they always would pressure and say, "For god's sake, guys, make a deal." They didn't want to get involved in the deal making. But here's the surface part, so what's it look like underneath? Maybe they've got 25 percent of this land, if you will, but they might have only 10 percent of the oil or they might have 50 percent of the oil, depending on how the reservoir is. So that was always the arguing point.

I think Sam made a pretty good deal for us. He just basically said, "Here's our number." I don't know what it was, 22 percent or something, I think. It may have been a little more, but anyway, "Here's our number. If you don't come in—." This was the deal. The platform was on its way out. I think what he told me one time that he said, "If you haven't signed that by the time it's launched, then you don't have a deal. We're just going to go ahead. Now you can figure out what you want to do and we'll just put wells along the line until you figure it out." I think they got the telex in just before we launched the barge.

TP: That was a good story. I had talked to him actually a week before he had a heart attack.

GS: Oh, really?

TP: Yeah. So I did get a chance to talk to him. It was nice.

Well, why don't we just turn this off now, I think.

[End of interview]