BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT

Interviewee: Lou Wilkerson

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Place: Prosper, Texas

Interviewer: Jason Theriot

Ethnographic preface: Lou WIlkerson grew up in Pine Bluff, Arkansas, and he took a degree in mechanical engineering from the University of Arkansas. Subsequently, Wilkerson went to work for Shell in 1961, and later completed a master's degree in chemical engineering. Wilkerson worked on a thermal project in East Texas, Arctic design projects, but predominantly on subsea and deepwater activities in engineering management. He helped to deploy Shell's first subsea manifold experiment, in the Gulf of Mexico in the late 1960s. Wilkerson also worked on the pipelines for the landmark Shell Cognac fixed platform. In the 1990s, Wilkerson was tapped to be the project manager for the massive Ram-Powell tension-leg platform. Wilkerson retired in 1999.

JT: This in an interview with Lou Wilkerson. We're up here in Prosper, Texas, and it is the twenty-sixth of June 2009. We're talking about the Deepwater and Gulf of Mexico Shell Oil, and the interviewer is Jason Theriot. So we're going to get started.

Tell me a little about your past, where you're from, your background, maybe your academic training, and how you got interested in engineering, and then those early days with Shell.

LW: Okay. I grew up on a farm out of Pine Bluff, Arkansas, and I guess the one thing I learned about farm life was I figured there must be something better. So that was kind of a motivator for me to do well in school and also try to find something that I would enjoy doing with my life. I had a friend who was an engineer, who was an electrical engineer, and so he kind of encouraged me. But I guess most encouragement I got was from a summer job that I had with the Planning Commission in my hometown, and the city planner was a real strong proponent of higher education. He had gotten his degrees at Cornell, and he really encouraged

me to go ahead and become an engineer. I was their draftsman on a part-time basis during the summer.

So that's what I decided to do, and I guess luck would have it, it turned out that engineering was probably the best fit for me about anything I could have chosen. So I got a mechanical engineering degree from University of Arkansas and subsequently worked for Shell for a few years and then went back and got a master's degree also in chemical engineering from the University of Arkansas.

JT: Big Razorback fan?

LW: I'm a Razorback, fan, yes. Not as strong as I used to be, but I try to watch the games when I can.

JT: Baseball also?

LW: Yeah. They got a good team this year.

JT: Yeah. Of course, they ran into a better team.

LW: Yeah, that's true. [laughter] I also have a daughter who graduated from LSU, so I have kind of a split loyalty, but it's not split very much.

JT: Yeah, those Friday Thanksgiving games, I bet, make for an interesting family get-together.

LW: Yeah, they do, sure do, and they've been pretty competitive, too, so that worked out good for Arkansas.

But, anyway, when I graduated from college the first time, I went to work for Shell, and at that time they had a one-year training program, and I went to various different places throughout the training in all parts of the company and then ultimately was assigned to Jackson, Mississippi, for a while and then transferred from there to New Orleans. I worked there for about two or three years, and then I went back to the University of Arkansas for my master's degree. Subsequent of that, I hired back in with Shell and ultimately worked about thirty-seven years total.

JT: So that first year, what year was that that you went with Shell?

LW: That was in '61.

JT: Then you came back to work full-time after your master's?

LW: Right.

JT: What year was that?

LW: Sixty-six. Yeah, I quit in ’65, and then I came back. It took me about thirteen months to get my master’s. Wound up coming back in ’66.

I’ve been fortunate to work for Shell in that time whenever the technology area was being pushed. We were always in new frontier areas. Actually, when I came back in ’66, I started working on a thermal project in East Texas.

JT: Yeah, Chuck was telling me that. Very interesting.

LW: Then subsequent to that, I got involved in various different offshore projects and Arctic projects and carbon dioxide tertiary recovery projects, but most of my time in Shell was spent either in subsea or deepwater activities, primarily in engineering management.

JT: So at some point, I guess you had to move back to New Orleans. Is that where you guys were stationed out of?

LW: I’ve been in New Orleans four times in my Shell career.

JT: So what was the first—let’s talk about those unconventional Shell projects that you worked on, and then we’ll talk about the deepwater stuff.

LW: Okay. Well, the Slocum Thermal Project [phonetic] was Shell’s first project in Texas, and basically it was injecting steam into a formation that was about five hundred feet deep. The viscosity of oil was quite high, but once the steam heated it up, it could be pumped well. So there are a lot of facility requirements for handling all that type of either steam or production and whether it’s in oil treating, which was very difficult to do because of the highly viscous fluid, or handling the produced gas, all of those were pretty good challenges. So a lot of the things were fairly unique at the time that we were doing it.

JT: Was it an experimental operation?

LW: It was a full-scale development. I got into it in the first phase, and then we subsequently developed several different phases of the project. I think ultimately Shell sold it to someone else, sold out on it, but it was a successful project. There just wasn’t a lot of reserves to produce, and because of all the complexities of it, it was not as profitable as producing more conventional oil and gas. So since oil prices didn’t go up as a way as expected, it pretty soon became a marginal project and it was not really pursued by Shell.

JT: So you were working on that in the seventies, I assume?

LW: No, it really was probably till ’66 to ’69. Then I got transferred to New Orleans, and at that point in time I was assigned as section leader in the Facility Engineering Group in one of the coastal divisions, so I was responsible for several large gas-processing projects at Calumet plant there in Morgan City area and North Terrebonne near Gibson. Had the project out at Waclawski [phonetic].

JT: Where’s that?

LW: That’s east of New Orleans. We had a number of big gas-processing plants that Shell was the operator on, but in most cases there were a number of different owners, and so there was a lot of requirement to deal with processing agreements and ownership agreements and things of that nature, and that required a lot of effort as well as the technology involved in processing the gas to recover liquids. So I spent a year or two in that, and then I followed that with a broader job as a division mechanical engineer and worked there for a while.

Then in the early seventies, I was assigned to a project as a project leader on a joint development program for the Shell-Lockheed one-atmosphere system. We had completed some wells within a one-atmosphere chamber, but we recognized that in order for this thing to work, we had to have some way of manifolding multiple wells and producing to a remote location where the production could be handled in. So I was responsible for coming up with the manifold center design application, and we built a prototype center and installed it at Eugene Island 330 and produced three wells into it for a period of time.

JT: Three, four hundred foot of water, something like that?

LW: That was shallow water. It was about 240 feet, but all of the applications were set up so that they could be applicable in 3,000 feet of water.

JT: That’s very interesting. Let’s back up a little bit on that. I guess this was an idea of Shell, and they just went to Lockheed and asked that they had done any type of experimental research on this before? What brought those two together?

LW: I suspect it was more an idea that originated in Lockheed, because they’d developed submarines and they had used one-atmosphere systems with diving bells in order to be able to rescue people in submarines that were disabled. I guess in the process they must have come up with the idea, well, wonder what would happen if we had an oil well on the seafloor, and could we use a diving bell to service it or something like that? I’m speculating now because I can’t say for sure.

But in any case, Shell got together with them and decided to look at the process of developing such a system. Everybody wanted to get in deep water, but there

wasn't a real good way to do that at that point in time, and the fact that we had submarines that operated in deep water was probably the basis for coming up with the idea and the scheme that we ultimately developed.

To kind of get to the end of the story before I go any further, we developed a system that was proven to be applicable in deepwater. At the same time, others were developing a remote-operated vehicle capability that would allow us to swim manipulators to the seafloor and so forth and do a lot of the same work that we were going to do inside chambers, and in most cases it could be accomplished with less risk to personnel. At the same time, it also was probably capable of being done more quickly because you didn't have to worry about chambers and service vessels and things like that.

JT: Cheaper, too, I'd imagine.

LW: Probably ultimately it was, but at that point in time, we didn't know for sure. But it turned out that we redirected our efforts away from the one-atmosphere approach to the swimming manipulator that we ultimately use now.

JT: Was there a reason why they selected you to kind of take the lead on that?

LW: On the manifold center project? I don't know—

JT: Did you have any prior experience or interest in any of that subsea [unclear]?

LW: No, I've always been kind of a hands-on operating, you know, mechanical engineer, and I also have probably a skill in being able to work with others in order to accomplish things. And since we were doing this as part of a joint development program where Shell and Lockheed were in the lead roles, but in order to be able to fund it, we had sold membership in this program to just about all the other oil companies, so there must have been fifteen of them. So they needed somebody that would be able to communicate with all the oil companies and also work with the technical folks, with Lockheed and so forth, so I got an opportunity to do that.

JT: You had done that work with those compressor stations, working with [unclear].

LW: The gas plants and everything that we built, we had a lot of co-owner problems that we had to address. Just about everything within the oil business ultimately becomes an issue in dealing with other companies, whether it be contractors or other oil companies. So I had a lot of opportunities over my career to do that sort of thing.

JT: So this experimental system that y'all built, how big is it? Big as your living room?

LW: The manifold center was about, I don't know, fifteen feet in diameter and about thirty feet long, and it set on a base. The base was kind of like a barge, except it had trim tanks on all four corners, and the trim tanks were set, whenever you put the thing on the seafloor, the idea or the scheme we came up with was we were just going to sink it, just flood the base and allow it to just sink on the seafloor, with the idea being that it would sink level. The reason for doing that is because we didn't have a lot of these large semi-submersible dirt barges that we have today. There wasn't any way that you could really go out and have a large system that could be lowered to the seafloor on a cable, especially if you were looking at doing it in 3,000 feet of water. So the idea was we would just be connected with an umbilical and open valves and let the thing flood, but you also needed to have these trim tanks on each corner to be able to adjust it and make sure that one side didn't get down further than the other and it would not settle correctly.

So we sunk it on location in 240 feet of water. Things didn't go as planned because we had pretty high seas when we tried to do it. When we did, the current and the waves caused it to tilt, and ultimately the thing slid down at an angle and wound up not on the location that we wanted it on, but it did wind up flat on the seafloor, and we had to reroute some pipelines from the wells in order to get them to the proper location, but it worked out fine. But that was one of the interesting things about the project. It went awry, but at the same time it was still successful ultimately.

JT: It produced?

LW: It produced, yeah.

JT: So you had a well down there with some pipelines running to it and this manifold system comes down to get on top of the well or to—

LW: No. The wells are spaced out maybe 3,000 feet apart or something like that, and then we located this manifold center here, and each one of these wells has what we call a funnel for the pipeline to enter into it. So the lay barge would lay down a standoff location and it would be pulled into location on a wellhead, and so once the connection was made at the wellhead, then the pipe was laid down and then ultimately connected to the other end and pulled into the manifold center, and then the same thing through the manifold center produced to a platform over here.

JT: It sounds very similar like an early model of subsea that we have today.

LW: Yeah, yeah.

JT: This was the first time that Shell had done something like this?

LW: Well, it's the first time we'd had a manifold center. We'd actually had a couple of wells that had produced in a one-atmosphere chamber before, but they'd been connected directly to a platform. So this was kind of the second phase of that development program.

JT: My understanding is subsea development involves all of these components that we've seen since the nineties and up to today, correct, at some phase?

LW: They're a little bit different because you don't have the on-bottom interface for personnel, but all of the components are still required that we were using, different designs of them, but you have to have the well connected to a pipeline and you have to have it connected to a manifold.

Now, then, that we're able to do a lot of horizontal drilling and things like that, most cases you just have several wells located around the manifold, very close, and the connection into the manifold is just with hard pipe that is lowered and you connect vertically on both sides. But the pipe may be twenty, thirty feet long, whereas here these pipe were actually bundles of pipe, because you had to have a gas lift line, you had to have a flow line, you had to have a control line, and all of them would have to be located there. Here you don't usually use the bundles, but you do have to have connections of those various different components as well. So it was just an early phase of what you're seeing today.

JT: And there was a diver?

LW: We had a diving bell, so all of the work was carried out inside a one-atmosphere system. It was only elevated two or three pounds above normal atmospheric pressure. But what happened is you'd have a teacup, they called it, on top of the manifold chamber and a call-up buoy, which would get released, and it would bring up the line. The line would be tied onto a winch on the bottom of a diving bell. Actually, it would be a soft line initially, and then you'd pull up a cable. So you're tied in with a cable from the bottom of the diving bell to the top of the wellhead chamber, or the manifold chamber, and then you use the diving bell's winch to pull itself down. It's positively buoyant. And then it's pulled down onto this surface, which is a seven-foot-diameter surface that matches the diving bell. Once those mate, then all you have to do is to pump the water out from between those two chambers and just open the hatch.

JT: Then the guy can get in there and work the valves or the equipment that's down in there.

LW: Yeah, and all of the connection work of the pipelines and everything like that, all the connection work for the gas lines, the hydraulic lines, everything is done inside the one-atmosphere chamber. The dives lasted about twelve hours in most cases, and so five or six people would be down there working for that period of

time. Then they would come back up, switch crews, and another crew go down. All this was operated off of a workboat that held all the equipment. It was about a 210-foot workboat, 210-foot-long workboat. So I spent quite a bit of time on seafloor.

JT: That's fascinating. Did you ever go down there?

LW: Yeah, yeah, I sure did.

JT: You went in the dive bell down?

LW: In the diving bell, yeah. Probably most of the work that I did was so sated with issues on solenoid valves and things of that nature that were kind of unique to our operations, kind of a diagnosis and correction problem, and it was a really interesting effort. And the good thing about it is that once we got everything together, it worked well, produced for a number of years, and ultimately they shut everything down, whenever they pretty much depleted it.

JT: Did they go to another field or this was it, this was the one time they used this system?

LW: The only application where the manifold center was a commercial application was in Brazil. I think that's right. There may have been another one, but the biggest one was in Brazil. So Lockheed, or Lockheed Petroleum Services, sold the system to Brazil, to Petrobras, and they went down there and they put in a number of wells, I don't know, maybe ten, fifteen wells, and they produced it for several years as well. But I don't know of another commercial application for it.

JT: This sounds so similar to what the navy has now perfected, those kind of mini-submarine systems that can go down and attach to large submarine ships for either transporting or emergencies, going in on rescue operation, those kinds of things.

LW: Actually, the diving bell system, the design of it, actually a lot of the same features came from this DSRV, which is a rescue system that Lockheed helped to develop for the navy, and so they used a lot of the same people and a lot of the same technology to come up with a diving bell that actually served our systems.

JT: Where was most of this equipment manufactured, in Louisiana?

LW: For us, either in Vancouver, British Columbia, or Morgan City. Lockheed had an office and a service center in Homa, and so a lot of the hardware was delivered and assembled there.

JT: So this was it, though? I mean, it started as an experiment, but it worked, it produced, and then you guys didn't pursue it further?

LW: That's right, yeah. We continued to consider it as an alternative, but the one thing was that since the ROV came along about the same time, well, Lockheed wasn't able to really sell the system as being the best choice and get people to commit to use the one-atmosphere system, compared to a manipulator operative system that could be serviced by more than one vessel or two vessels. They actually wound up with two workboats set up for this operation, but if you get a number of fields, you're going to need more than one or two service systems to be able to handle it. So it never grew, and as a result, it pretty much became a noncompetitive application that we got away from.

But one of the opportunities that we considered one time was putting one-atmosphere chambers on the bottom of a Cognac platform before it was installed and use those chambers to connect pipelines. Again, the J-tube was used instead, so it was chosen to be the preferred approach compared to the one-atmosphere system. But it would have worked just as well. You could have built the chamber at the bottom of the platform and been able to pull in a pipeline into the chamber and just bolt it into a preexisting pipeline that would go up through the platform. But we didn't do it. It was probably one of the other applications that Shell considered, in addition to just manifolding subsea wells.

JT: And Shell, as they've always done, was looking ten, twelve, fifteen years ahead and realizing that thousand-foot depth is right around the corner and then even further.

LW: Yeah.

JT: So they were looking at some ways to connect with stuff down below.

LW: Yeah. At the point in time that we started the development of the one-atmosphere system, we thought that 3,000-foot water depth would carry us a long time, and so that was our objective. The first step happened to be Cognac.

JT: So did you get to work on that one, on Cognac?

LW: Only from the standpoint of looking at the pipelines. That was the limitation pretty much of what I did at that point.

JT: You mean pipelines coming up to the production facility on top?

LW: The oil and gas pipelines leaving the platform.

JT: Let's talk about that. I'm very interested in pipelines, as I mentioned before. Part of the planning for a big new operation like Cognac, tell me a little bit about what goes into, including the pipelines, oil and gas pipelines, flow lines, and all the

equipment that goes into that all the way to onshore storage or facility or refinery, whatever.

LW: Okay. You may have misunderstood. Basically what I did at that point was try to look at the possibility of using the one-atmosphere chambers on the bottom of the platform to connect the pipelines out for the oil and gas delivery, and that's what we couldn't sell compared to a J-tube. But basically all of the actual work of where the pipelines go to, what their routes are, and that sort of thing, I was not part of that. I was mainly just looking at the hardware, whether or not we could make it work for the one-atmosphere system.

JT: So what's a J-tube? What does that look like?

LW: Most of the platforms are built in a form like this, and they have built into the framework of the platform a tube that makes a J, and it comes out horizontally at the bottom of the platform. So once the platform's installed, normally you have piles that are driven in the corners. In some cases you have dirt piles that hold the platform in place. But once it's secured, what they do is have a lay barge sitting out here that gives you a platform or a pipeline that has kind of a bull nose on it connected into a cable. The cable, you have a winch on the platform, and it pulls that pipeline up to the surface. So there's no requirement to go down and attach a pipeline to the platform itself or anything like that; it's just pulled in place. So the only thing that you have initially is a J-tube and a cable that's threaded through it, and it's tied at both ends at the surface, and then the cable is passed to the lay barge and then it's pulled up.

JT: That's interesting. Who came up with this concept?

LW: Shell. Shell had a patent on the J-tubes, and people, companies worldwide have—Shell probably made more on that patent than probably any that they've ever had.

JT: Was Cognac the first fixed platform you were using?

LW: No. It'd been used several times before.

JT: That's interesting.

LW: It's kind of unique in Cognac's situation, though. It's three parts.

JT: Make sure they fit, huh? I think it was Dan who was trying to explain how important measurements were in thinking about this project and designing it, of course eventually the installation. A quarter of an inch off could mean a great big deal in the early part of the project. So then you can see why for all the other additional stuff that was added on to it.

LW: Yeah.

JT: So you don't need something like this for a floater, for TOP? You still use a J-tube of some type of—

LW: Well, it depends. In a case like Mars, the pipelines are actually catenary, so the pipeline is laid out there and then it just hangs off the platform. It kind of makes a J-tube, or makes a J, but it's really just hung off the platform and it forms a catenary. In some cases, you have risers that are vertical. In those cases, I believe that there are situations where the pipeline is actually pulled in and up to the surface so that you don't have to make any connections on seafloor.

JT: Is that how Mars is set up with risers?

LW: No, theirs are catenary risers.

JT: So from Cognac and working on those type of J-tubes, where did you go next in Shell?

LW: We formed a Marine Systems Group in Houston, and that was where Shell started doing a lot of the early work on tension-leg platforms, and so whenever we finished up the project, the one-atmosphere system project, I went to work over there and we continued to work on one-atmosphere systems and applications and so forth, but we also started working on the tension-leg platforms and did prototype work on model testing and things like that for tension-leg platforms.

The fellow who headed up that project or that Systems Group was Carl Wickheizer [phonetic]. He was a really topnotch guy and good engineer, and I worked for him in that effort. I had a little group that I was responsible for, and then Carl was reassigned, and so I took over the group.

For a couple years we continued our work to try to develop deepwater systems, and we had a change in our exploration management, and there was a de-emphasis of deepwater, and we couldn't get the support we needed to continue the work because we were spending research and development dollars, and so we abandoned the group, and I was reassigned to a project called a Wasson CO2 project, and in that case we got a feel—

JT: Before we get to the CO2 thing, one question that I have is once you got involved in tension-leg platform design, was there any model to go off on? In other words, had someone come up with a concept like this before?

LW: Yeah, there was a lot of talk at that point in time and a lot of papers written about tension-leg platforms. Each one of the companies was looking into how we could

handle deepwater, and so we were part of that. We actually joined some joint development programs there. There was a company called Deep Oil Technology who developed a tension-leg platform, was actually installed offshore California to test some of the movements and so forth and see if they could match it to models. We were part of that. The platform that was built there was fairly small. It had three legs and a trapezoid or a triangle-type platform. We got some good information on that and continued to develop it, and that kind of formed the basis for a lot of the work that we ultimately did in coming up with designs like Auger and subsequent platforms.

JT: Tell me a little bit more about that prototype and this company, the other company working out of California. Who were these guys?

LW: I can't remember their names anymore, Jason, but they were basically entrepreneurs trying to sell their technology, except they really didn't have a lot of technology. They had some good ideas, and so ultimately they were able to get support for a lot of the work that was done to try come up with parameters that would be useful in the designs of such platforms, but they were really wanting to be able to sell the platforms and have people come to them with a design or with a requirement, and they would design a platform for you and put it in. Ultimately that was a market that they couldn't break because they really didn't have yards to do it. They'd have to go back to fabricators themselves and that sort of thing. So they helped to develop the technology, but they really were on the outside when it came to being able to build stuff.

JT: That's interesting.

LW: If you give me a few days, I can probably remember some of the people, but I don't know. I don't remember them now.

JT: So you guys were going off of their drawings, off of their data, off of their reports that they had done for that prototype?

LW: Yeah. We had people in our Research and Development Group there in Bel Air, just out of Houston, and they were doing work to try to predict what kind of motions you'd have. They used the technology or the results of the studies that were done, the prototypes that were built, to be able to verify and modify the models that they had.

All this was done in the mid seventies, mid to late seventies, and it was soon after that that Conoco actually installed the first tension-leg platform that I can recall in the North Sea. It was a commercial installation, and it ultimately proved to be a good application of the—as far as I know, it was profitable and they operated for a number of years. Then after that, they put in a TOP in the Gulf of Mexico in about 1700 feet of water.

JT: Conoco?

LW: Conoco. I think it was less successful, but at least it continued to build the technology and everything that we were working on. Then about the time they put the one in the Gulf, Shell was developing the Auger field, and we actually put in one that was kind of a combination of a tension-leg platform and a catenary mooring system. It had two mooring systems, to be redundant. So we had the vertical pipe as well as the catenary mooring, the cables to hold it in place. Auger was developed so that we had a subsea blowout preventer that would be moved to each of the wells.

JT: How many wells?

LW: Twenty-four, something like that. That was the first place that Shell used it, but it's the only time we've ever used the two systems, the two mooring systems. Subsequent to that, we gained the confidence that we needed on the vertical system, and all the other TOPs just got the pipes to hold it in place, the tension members.

JT: Let's back up and go to your CO2, which I guess you worked on after Cognac in the eighties.

LW: Right.

JT: Tell me a little bit about that and maybe how that experience kind of helped you later on with the TOPs, if it did at all, or Ram-Powell project. To my understanding, you were the project manager for Ram-Powell.

LW: Right. Shell was the operator of the Wasson Denver unit, which was a large oilfield in West Texas, just out of Denver City, Texas. The field had produced for a number of years, probably since the late thirties or something like that. Then it was at the point where it was in decline. We'd done a lot of work on using CO2 as a flooding agent to free up the oil from inside the formation, and so it was decided that that would be an ideal application. It turns out that Shell also done some work up in Southwest Colorado, and we had a CO2 field up there that had 98 percent carbon dioxide in the produced fluid or produced gas, and so it was decided that that might be an option and a source of CO2 to flood the Denver unit.

Ultimately, our project became one of developing the carbon dioxide field in Colorado, leaving a 30-inch pipeline to West Texas and then flooding the Denver unit and then taking the produced fluid, which would include a lot of carbon dioxide now in the produced gas, have to separate the carbon dioxide from salable gas, and then be able to lengthen the life of the field by a number of years and recover, I think, about 10 percent more oil, so that the original recovery was

something like 30 percent and ultimately you could recover 40 percent of the oil from the field.

So, initially, I was the one responsible for all the surface facilities and the source field and the pipeline and the development in West Texas. After a couple of years, we had a change of assignments, and so I ultimately wound up responsible for the pipeline and the source field, and then a fellow named Jim Franklin, who had a gas plant background, came in to handle the development of the facilities in West Texas. So that took about three or four years, and we ultimately initiated the project and it was based on oil price increase that would take us to oil prices approaching $100 a barrel ultimately. We had forecast [unclear].

JT: Mid eighties?

LW: This was in the mid or late seventies. I went there in ’77, and the recession and drop in oil prices hit in ’81, ’82. That hit did our project too. We didn’t get the expansion of the pipeline and extensions nearly as quickly as we had planned, and, ultimately, Shell sold the source field. I don’t think they’re the operator of Denver unit anymore, but they may be.

But, again, it was one of those situations where our projections of what was going to happen to both the oil prices and our needs for oil turned out to be not too accurate, and it affected the project viability. It was a very successful project from a technology standpoint. We had one other operator, Mobil, who owned part of the source field, so most of our development of source field was done with Mobil Oil Company. They also had part of the pipeline, and then we had beaucoup people that were partners and interest owners in West Texas. Ultimately, the pipeline was extended to several other fields where they were doing CO2 projects. But I guess the main opportunity that I had in that development as project manager was to make sure that we get both the technology and the relationship with our partners that would allow us to move forward and get the project done, and so we did.

Then after that, I went to our Alaska Technology Group, which was developing some production in the North Sea, and I worked on that a couple years before going back to deepwater.

JT: Shell, are they still involved in CO2 projects such as that one?

LW: As far as missible flooding is concerned, I suspect that they have some, but it’s a very limited extent of it, I’m sure. Probably a lot of the things that we were trying to do then, they have shoved back in terms of timeframe for it to be required, and in some cases it’s been able to be stalled because of horizontal drilling techniques being able to produce at a higher rate and gain more of the reserves just by

drilling horizontal wells rather than having to install the systems for CO2 injection and production and recovery and that sort of thing.

JT: So after the North Sea, back to New Orleans?

LW: I'm sorry. I said North Sea; I should have said Beaufort Sea in Alaska. We built a gravel island while I was responsible for our Alaska Technology Group, working with Union Oil Company and Amoco, who were part interest owners in our field. I don't know if you're familiar with the gravel islands, but what happens is that during the wintertime you build a nice road out to the location. This was in about forty feet of water. Then we would recover gravel from onshore and truck it out to the location we wanted to build a gravel island and dump it until we built the island in the forty feet of water. So it was a full-time operation for several months. Then the wells were drilled and it produced for a short time, but the recovery—again, it was during the time whenever oil prices were depressed, and so it just wasn't economical under those conditions. Island is still there, I'm sure, but it will have to wait for some more.

JT: It seemed there were quite a few of those projects going on in the Alaska area with Shell and with many others.

LW: With many others. And even today, you know, they have environmental concerns in the Chukchi Sea sea development, but that's just an additional cost of doing business up there that makes it less economical whenever you try to do something in an environment of lower oil prices.

JT: And risky terrain.

LW: Yeah.

JT: It's not like the open water, right? So where did you operate out of? Anchorage or—

LW: No, I was still in Houston. We had our Alaska Group there. We just traveled back and forth out of Anchorage and go to the North Slope whenever the actual construction work was being done. There's a lot of design work associated with it. We were doing a lot of other work, thinking that if we did find a lot of oil up there and could develop it, you couldn't do it on a gravel island, so you'd have to have a system that would be able to take the ice forces as well as provide for all the wells and the facilities and everything. So we were looking at conical structures made out of concrete primarily, that would be built and floated up there and set on the seafloor, and all of your drilling and production work would be done from those. So we did a lot of studies like that and initial designs as part of this Joint Development Group with Amoco and Union, and we were prepared, but we never did apply them.

JT: That's interesting. You don't hear about a lot of those types of projects that go on that companies invest so much in and don't necessarily get a big return and just kind of move on to the next one.

LW: That's right. And the unfortunate thing is that in Shell, a lot of that work that was done will probably never be used even if they come back and try to develop a field like that. If they are successful in getting a find up there that would make it applicable, a lot of that work is probably either so poorly documented or filed, that you just won't be able to find it. Have to start over again.

JT: Or hire researchers to go in and dig through it.

LW: I guess so.

JT: That's what we like to do. Okay, well, let's move on to your deepwater. Was Auger—were you involved in that from a project?

LW: Peripherally. Actually, when I came back or when I finished the job in Alaska, I was assigned as a manager of offshore engineering and construction, and I was responsible for everything in water depths less than Bullwinkle. Gordon took the Bullwinkle project, and then I was responsible for all the shelf developments. So I worked there for about four years as a manager of that group. We had a bunch of people, various different areas of work from platform to pipelines to facilities and so forth. Also surveying. That was a good time. Probably one of the reasons I was in that job was because we had an organizational setup that we had an offshore west and an offshore east, but because of the need for a group that could handle projects for both, we served both of the organizations. So I had a production manager in the east that I had to satisfy, as well as one in the west part of the development.

I was in that job for about four years and then I was assigned as a project manager for the Ram-Powell project. Ram was one of the earliest discoveries that Shell had in deepwater, and our partners were Amoco and Exxon.

JT: In the lease?

LW: In the lease. Shell had—I think they had about 38 percent of the development, and Amoco and Exxon had about 31 percent each, so we were really close in our ownership percentage. And since we're talking such big money, nobody wanted to turn over the project to someone else to do without having a lot of say-so about what was done, what the costs were, and what the timetable for doing it was. Also there was a lot of concern at that point of moving out into 3,000 feet of water as to what risk companies were willing to take. So the project was set up at that point in time where we had a representative from Amoco and one from Exxon,

and I was responsible for leading an effort to design or to decide on the development system that we would apply. It wasn't a question of whether or not we would end up TOP that we'd already started working on for Auger, but it was more of a do we want a TOP or a SPAR or a subsea development or what. So we had to go through a program of studies to try to decide which one was applicable and most profitable for that development.

JT: That's working with the other two partners?

LW: Right. What we did, a lot of the work was done out of Shell's office of Civil Engineering Group or our Research Group, and we also had outside studies, but we were responsible for working together with each other to make sure the results of whatever work was done was something that each company could accept as valid. We pushed it to the point where Shell was ready to go forward with the project. We felt like we had good cost and we had good schedule control and everything, but Amoco and Exxon weren't prepared to move forward, and we were just butting our head against the wall. So Shell decided, well, let's just back off and we'll wait. That was about the same time that we made the discovery at Mars, and we were still working on what to do about the Auger development.

So I was continuing to work on this Ram-Powell project, which wasn't a full-time job anymore, so I took responsibility for the subsea development effort in our Deepwater Group. So we had a Subsea Development Team that we used to develop the paw-paw [phonetic] project. I don't know if you've heard of that. That was one of the first deepwater developments. Tahoe and several other projects during that timeframe.

So we went through that process, and then whenever we were able to get Amoco and Exxon off the dime to move forward on Ram-Powell, we remobilized in that effort and set up to do that project. One of the things that we agreed to within Shell was to allow Amoco and Exxon to assign team members to a joint team that would work for me and be responsible for leading the effort on the design and construction of the project.

JT: Was that something new?

LW: That was very new, yeah. We had situations where people would come in and they would work as individuals, maybe, or they would work as liaisons, and they would keep track of what was going on, but they wouldn't be responsible for actually making decisions on what to do and who's to do it and how everything's going to be carried out. But actually what we did was we had project team members that became a part of the project, half a dozen or so from Exxon, same number from Amoco, and we actually made an Exxon guy our construction superintendent on the project. So I had design guys and operations folks and construction people all reporting to me, but in the case of the construction,

actually reported to the Exxon superintendent. So that was very unusual. It worked out good, and it was a basis for doing some of the same things on Mars and later projects.

JT: Chuck made a great point. I didn't realize that Ram-Powell was an earlier discovery. But he said he recalls a meeting between you, him, and, I guess, Gordon and then Carl. His name's Carl?

LW: Carl Wickizer, right.

JT: And each one of y'all had to bring a project plan for Auger or what have you.

LW: Right.

JT: Auger was a Shell-only project, Mars was a joint venture with BP, and Ram-Powell was a three-way venture.

LW: Right.

JT: So one of the factors in choosing to go with Auger first was the fact that it was just a Shell-run operation and so they would use the lessons learned from that to apply to a much tougher operation with a partner, and then use that with Mars to apply that even further along with Ram-Powell, where you had three partners total, which is probably why—I'm only guessing, but because of your experience, as you just told me, going back, that you consistently worked on projects that involved multiple partners.

LW: Yeah.

JT: So I'm wondering if maybe that's why you were chosen for the Ram-Powell with Amoco and Exxon.

LW: That, I'm sure, had something to do with it. I tend to be able to work with most—or was able to work with most anybody. We did have some situations where it didn't quite work out, but in most cases everybody wants to do the right thing, do the same—they don't want to do the same thing, but they want to be able to do the right thing. So sometimes it takes convincing and so forth.

One of the things that we had happen in Auger was we did a lump-sum bidding of all the major activities, and we really had a lot of conflict between Shell and the contractors on that project, and a lot of it may have been personalities, but a lot of it was just doing the first things and not having enough documentation and things like this to make sure there weren't any questions that couldn't be answered. So as a result, we wound up with a lot of conflicts, and it turns out that when we got around to Mars—and Mars actually moved ahead of Ram-Powell because BP was

really ready to go. They wanted to move forward with the project, whereas Amoco and Exxon weren't of the same mindset.

JT: Any reason why you can think of, I mean other than economics, but were there some other reasons why those two companies were not ready to go in the early nineties?

LW: Probably Exxon was bureaucracy as much as anything, but the main driver for someone like BP was there were a lot of reserves associated with Mars, more so than Ram-Powell. Ram-Powell was probably 250 million to 300 million barrels equivalent, and Mars is a billion. So you've got a more reason to move forward quickly. But whenever we got to the point where we could get agreement with BP on Mars, we decided that maybe one way to avoid some of the problems and the conflicts we had with the contractors was decide on who we'd run contract with and try to have some kind of a partnering approach so that we wouldn't have to bid and still be able to get competitive pricing. That was also a time whenever things were really slow in oil patch again, and we were able to work with some preferred contractors that were willing to take that approach and share some of their costs and prove to us what it was costing them and that their profits were reasonable and things like that.

So we were able to do a partnering approach on Mars, and so the idea was, well, it looks like it's going to work, but at that point in time, we were ready to come forward on Ram-Powell and we wanted to do the same thing there. It took a while for Amoco and Exxon management to come around to agree that what we were trying to do was the right thing to do.

JT: It was a new concept.

LW: A new concept or new application of that concept.

JT: Dan Godfrey [phonetic] spoke—most of the three, four hours we were there was him laying out the very detailed plans for that alliance, that partnership, at Mars, that is really, really significant, I think, in the whole deepwater development.

LW: Yeah.

JT: It's probably not used so much now, but in those first four or five big projects that y'all were involved with, that was a big part of Mars definitely moving forward.

LW: Yeah, I think it did a lot for Shell and it did a lot for the oil business and service companies to be able to take that approach, because had we not been able to get some concession from the contractors on the pricing, wouldn't have been nearly as profitable and wouldn't have moved forward nearly as quickly. It was good

that we were able to be successful on Mars early on and be able to demonstrate to the Ram-Powell partners that it would be something that would be applicable.

JT: Did they join in, in those new kind of partnership agreements with the contractors?

LW: Yeah, and I think that as far as the guys working on the projects, it was pretty evident early on to them that it was the right thing to do. As construction superintendent that Exxon assigned one of their better people, and so I'm sure he fed back to Exxon what we were doing, why we were doing it, and how successful it was. So it made our ability to work with Exxon management probably easier as a result of having him and a couple of other guys onboard that could give some informal feedback to their counterparts in the company that weren't on the project about what we were doing and how good it was working.

JT: So you were the project manager on Ram-Powell. What was your specific role on Auger and Mars, or were you working on other things during that time as well?

LW: Okay. Well, early on, we set up folks that were reporting to Carl Wickheizer, which Chuck's mentioned to you, and we would have regular meetings and updates on what was happening on each project, and there was a lot of interaction between not only Carl, but with all the guys that were reporting to him about what we were doing. Since we weren't able to influence a lot of what was happening on Auger because they were moving forward on an all-Shell basis, the things that we were able to do was to talk about what was happening on the other projects, and those things that were useful to them could be picked up and applied on Auger. But more specifically, the things that Auger was doing was something that the Mars and Ram-Powell would benefit from and the reasoning of why it was done.

So that was the initial communication and organization, but as it got further along, we found that one of the things that was most useful was for each one of the project managers to be able to sit in on some of the major meetings with contractors or with operators on the other projects. So we actually formed management teams for Ram-Powell and Mars and ultimately subsequent TOPs so that each of the project managers would meet on a periodic basis and share information and recommendations and things of that nature that would be applicable to each one of the projects.

Some of the things that happened on Ram-Powell were probably as much a result of different personnel looking at the same problem and coming up with different ideas, as anything else. But whenever we had developed Auger, we'd used the subsea BOP and had to be responsible for running the BOP stack on each well and that sort of thing.

JT: BOP means what?

LW: Blow-out preventive. What happens under those conditions is there's a lot more hardware on the seafloor and there's a lot more opportunity for things to be dropped. The risks are different. So one of the guys on Ram-Powell had looked at the problem and came up with the idea of having a surface BOP and a high-pressure drilling riser that would be located between the surface BOP and the wellhead connector on the seafloor. So that it just changed the total concept of how you would drill the wells. Well, we did a lot of evaluation and decided that's what we wanted to do on Ram-Powell. It was too late to make any changes on Auger, but Mars was able to pick up that same information and apply it. They actually changed their design to include the same thing, and I'm sure we did a lot of the same things that Mars had looked at and we captured those learnings.

But the real effort was a matter of trying to capture lessons for each project that could be applied to the other project and sharing those lessons, and we did that through a management team and then coordinating the different project teams below the manager level to make sure that we considered each thing that was identified as a lesson learned, and if it was applicable, make use of it, if it was not, we'd know why we didn't, and then ultimately come up with the best design and the best approach to the development as a result of that.

As far as the technical aspects of the effort, a lot of the technology was the same between the various different projects, and so the project managers didn't have any responsibilities for other projects as far as the technical aspects of the work was concerned, but questions raised by the other project managers would serve as a basis for considering different ideas and different techniques, and so it was more of a matter of manager and project team interaction whenever we were doing things differently that keyed us into coming up with what was best for a particular project.

JT: Sounds like a brilliant strategy. Was there one or two individuals who had had the forethought in the late eighties, early nineties, when these big finds were coming up to think that the best, most efficient way to run these three big projects is to essentially run them somewhat simultaneously and have intercommunication between all of those involved in working on through? Did someone think of that before, or was that something that kind of evolved through the projects?

LW: I think it was more the latter. I think it was a situation where you had a production manager in Rich[ard] Pattarozzi, he was willing to take risk in going with a partnering approach for contracting, rather than a situation where everything was lump-sum bid. That was a big hurdle for Exxon to get over. That was a foreign idea to them. So it almost required that we be able to demonstrate that it was the best approach for them to be able to go forward with it. So Pattarozzi had to agree to it and had to accept it as being something that he could

support, and then he took the lead of working with our partners as well to make sure that they understood why we were doing things and how we were doing it. Then I think it was a matter of everybody buying into it. He and Carl Wickheizer had been leaders in deepwater a long time, so they probably were key guys to make sure that worked.

JT: Where is Pattarozzi these days?

LW: He retired and he lives in—I guess he's in either Covington—he's at Money Hill. Do you know where that golf course is?

JT: Nuh-uh.

LW: It's north of New Orleans. It's just north of Covington. It may be in Abita Springs.

JT: Can you spell Pattarozzi?

LW: Pattarozzi, P-a-t-t-a-r-o-z-z-i.

JT: And he would have been production manager on Ram-Powell?

LW: He was probably general manager at that time. He ultimately became a vice president, but he was the one who Carl reported directly to and the rest of us reported to.

JT: I would assume that Ty has probably spoken with him already, but it's good to know he's up there in New Orleans. So Ram-Powell goes off. You guys build it, partners agree.

LW: Right. We ultimately worked with pretty much the same contractors that Auger and Mars worked with, and actually developed the project ahead of schedule and under budget. So it worked out all the way around and it was a successful project because we really, really had some good wells and it came up production quickly. So we were very pleased with the result.

JT: So how many wells?

LW: It was set up for twenty-four, and I think probably maybe we have twenty wells there now. I'm not sure.

JT: Any subsea tie-ins, subsea wells with it?

LW: Yes, I think there was a couple. Not initially, but subsequent to whenever I was working on the project, they brought in some more wells.

JT: About how much was it producing at its peak?

LW: It was designed for 100,000 barrels a day and about 250 million cubic feet of gas a day. It probably has come close to that. You could probably check online to make sure that those numbers are right. It may be 60,000 barrels a day of oil, but I'm not sure, or more.

JT: What does that product run into?

LW: There's a Viosca Knoll pipeline that handles the gas.

JT: I'm sorry, what was that first word?

LW: Viosca Knoll. That was the development. The block is in the Viosca Knoll area. There's a bunch of blocks in there called Viosca Knoll block.

JT: Near Ram-Powell, I assume?

LW: The pipeline, Viosca Knoll?

JT: Viosca Knoll.

LW: What that amounts to is the Gulf of Mexico is divided up into a number of different blocks or, areas. Eugene Island is one area, West Delta is one area, Viosca Knoll is one area.

JT: Okay. That must be way out there.

LW: Yeah.

JT: I've never heard of that.

LW: Well, it's not that far out, really. It's about fifty miles east of Venice, but the seafloor drops off real quickly, so it was in about 3200 feet of water.

JT: Is that where Ram-Powell is, is in that block?

LW: Yes, it's in one of the blocks in Viosca Knoll. So there was a pipeline that was brought in, and I'm not sure where the termination point is any longer, but the oil pipeline, I think, went to Main Pass 290 and tied into a Shell gathering system from there. Main Pass is another area.

JT: I'm familiar with that. So the oil went to NORCO, possibly?

LW: Yeah. They got into our gathering system that goes to NORCO.

JT: And what about the gas?

LW: I don't know who is the ultimate buyer on that gas, so I don't know, but it probably went into a Tennessee line or something down at the Venice area. That was one of the things, that the pipeline work that Shell contracts out to our pipeline group, and so as project manager, I was responsible to work with the project manager within our pipeline organization, Shell pipeline, but they weren't constrained to do their work the same way we did, in terms of partnering with contractors and so forth, so they did everything on a lump-sum basis, and as a result, the pipelines that were laid from Ram-Powell were laid by a different contractor than the ones that were laid from Auger and Mars.

JT: So Auger and Mars were McDermott, I think?

LW: I don't remember.

JT: So who laid the line for Ram-Powell?

LW: Allseas.

JT: Allseas, okay. Where are they out of?

LW: I believe Holland. They had a lay vessel called the *Laura Lei* [phonetic], which was new at the time that we used it, and they had lost the lay of the pipeline from Mars, and they were anxious to get into business too, so I'm sure we got a better price as a result of that.

Of course, one of the other things is those big pipelines require such a massive effort in terms of logistics and the laces [?], that the schedule of some of the contractors gets booked up and they can't be as competitive in terms of timing and so forth. I'm sure that resulted in the choice of Allseas, as opposed to whoever worked on Mars.

JT: So it was an eighteen-inch oil pipeline for Ram-Powell?

LW: I think they're ten and twelve inch, but I'm not sure anymore. It's been about fifteen years. I'd have to go back and look some notes, and I didn't do that.

JT: So when did you retire from Shell?

LW: In '99.

JT: So after Ram-Powell, which was, what, ’95, ‘96, or ’97, when did that project halt?

LW: I think first production was ’97.

JT: You retired shortly thereafter?

LW: Yeah. After Ram-Powell, I continued to work as a process manager. We changed our organization about that time. We got away from project managers, and we had people that were responsible for certain processes, whether or not it was engineering process or operations or construction, the idea being that trying to build a better organization where you really understood each process in detail and were able to make improvements in those so that there would be an overall improvement when you got all these processes together on a project. So we wound up the last couple years I worked for Shell, I was in a role like that and a construction advisor.

JT: Did the same kinds of innovations in project management that you guys saw in Auger, Mars, and Ram-Powell, those concepts, did that move on to the subsequent TOP and the SPAR projects of the late nineties and more recent?

LW: Well, I don’t know.

JT: Of course, you weren’t there. You’d already gone.

LW: I don’t know. I’m probably not a good person to answer that question because I haven’t been there, but some of the things that we thought were most successful whenever I was working on Mars and Ram-Powell and these other projects, in terms of developing a grievance with contractors and partnering and making use of lessons learned and improving processes to make the projects better, I think we lost a lot of that when we went back to the lump-sum contracting approach. I think as a result of the nature of lump-sum contracts, which kind of puts you in an adversarial role between the oil company and the contractor, you probably don’t benefit as much from lessons learned and improving processes. That’s what we were doing during that period of time. But we had a change in Shell management that didn’t see the benefits of that over lump-sum contracting, so Shell went back to the lump-sum contracting approach.

JT: I wonder if your other partners like BP, Amoco, and Exxon used those same kinds of concepts in their latter projects, that they took it on as well.

LW: I can’t talk to specific projects where they may have done that, but I feel sure that they tried to apply that to the extent that they could within their own organizational constraints.

JT: Is there anybody at maybe Exxon or Amoco, names that you might recall that would be willing to talk a little bit about the Ram-Powell project?

LW: Yeah. I would think that this guy that was our construction superintendent would be someone good to talk to.

JT: What's his name?

LW: His name was Doug Boening, B-o-e-n-i-n-g. After he worked in that role for Shell on Ram-Powell, he was assigned as construction superintendent—maybe not. He was over all their deepwater construction, and they built a couple of TOPs offshore West Africa, or maybe SPARs rather than TOPs. But he's a good guy, and as far as I know, he would be somebody who would be easy to talk to.

JT: Where did they get the name Ram-Powell from?

LW: Shell, at that point in time, was naming their leases. Each of these companies come up with a name for prospective leases before lease sales.

JT: Was it a moon or something?

LW: It's a lake. We had Tahoe, and then we had Powell, but Lake Powell is a lake out in Arizona.

JT: What is Ram?

LW: Ram was the code name that Amoco and Exxon used. So we just combined them. It was kind of the first indicator we would have trouble dealing with them, because nobody would give, you know.

JT: Wouldn't give on the name.

LW: So made them both.

JT: So what happened after 1999? You moved out of New Orleans, came up here?

LW: No. I retired and went fishing and played golf and everything for a while, and then we had one daughter that was living in Alabama and one living here in Frisco, and we were kind of halfway between. We lived in Mandeville, so we didn't see any reason to move. Then after Katrina hit, well, it wasn't too long after that that the daughter in Alabama moved with her family up to Salina, which is just north of here, and so we took the opportunity to move at about the same time. So we came up in 2006 and been here a couple years now.

JT: Grandkids?

LW: Got four grandsons live in Salina and two granddaughters that live in Frisco. And we're kind of in between.

JT: Part of the reason I'm assuming why you guys wanted to move back here.

LW: Correct, yeah.

JT: Because of those grandkids, right?

LW: Yeah. Our grandsons are involved in all kinds of kids' sports. The oldest granddaughter is involved in soccer. So we get a chance to do a lot of ballgame watching and that sort of thing. Don't get to do as much fishing with them as I wanted to because they're so involved in everything else, can't do it.

JT: Any consulting work, or what keeps you busy other than the grandkids and golf these days?

LW: I did a little bit after I retired, probably three or four years. But after that period of time, people pretty much forget about you unless you're really out there trying to drum up business, and I wasn't interested in doing that. So I haven't done anything the last couple of years.

JT: You still keep in touch with the old Shell guys you used to work with?

LW: Some of them I do. I don't know if you've talked to Bill Peterson [phonetic].

JT: I've not. His name has come up.

LW: He's a good guy. Bill and I lived real close together when we were there in Mandeville, and about the time that we moved up here, they decided to move out to California to be closer to their kids, and so they live in California now. So I stay in pretty close touch with him.

There's another guy that was involved in the subsea work early on, I think, Burt Carlson [phonetic]. He was a production engineer in his background. Bill and I are kind of facilities oriented. Burt, he retired a lot sooner than we did, probably mid nineties or something like that. He has a lot of subsea knowledge and he's got a good memory, so if you really want to pursue some things subsea, you probably could get in touch with him.

JT: What's his name again?

LW: Burt Carlson. He lives in Oregon somewhere. I think Bill has his address. Somebody else that I don't know where he is now, but somebody who was

responsible for most of the pipeline work that Shell did in deepwater whenever I was working is named Don Barry.

JT: Yeah, that's who Chuck also mentioned I should probably contact. B-a-r-r-y, right?

LW: Yeah.

JT: Well, good. Man, that's going to wrap it up.

LW: Good.

JT: A lot of information. Let me turn this off.

[End of interview]