BOEM DEEPWATER GULF OF MEXICO HISTORY PROJECT
OFFSHORE ENERGY CENTER HALL OF FAME

Interviewee: Marshall Cloyd

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Interviewer: Tyler Priest

Ethnographic preface: Marshall Cloyd studied engineering at both Berkeley and Southern Methodist University before finishing a master's at Stanford and Harvard Business School. In 1959, Cloyd began working in Mississippi for Brown & Root. Before long he followed the firm into the early platform design efforts in Alaska's Cook Inlet, engineering parts of the heavy drilling barges needed in the Arctic environment. Cloyd later returned to Gulf Coast work for offshore platforms in the Gulf of Mexico, before transferring to California to manage the Santa Barbara platforms. There, he and other groups within Brown & Root helped in the clean-up after the 1969 well blowout and oil spill at Santa Barbara. Cloyd later saw work in the North Sea as well. Cloyd purchased a small boat service company in the early 1980s, and remains Chairman at the time of interview.

File 1

TP: This is an interview with Mr. Marshall Cloyd for the 2010 Offshore Energy Center Hall of Fame induction.
Congratulations.

MC: Thank you very much.

TP: Let's start with some background. Where are you from? Where did you grow up?

MC: I was born in Dallas, Texas, and went away to boarding school at Andover for four years, and then went on and studied engineering at Berkeley and SMU, picked up a master's at Stanford, and went to Harvard Business School.

TP: Was your family in this industry at all?

MC: The industry really didn't exist. My father had gone to MIT and Harvard Business School, and my grandfather was an engineer from the University of

Texas, involved in building and operating railroads. So the linkage to being in the engineering business goes back a hundred years.

TP: Out of college, what was your first job?

MC: I was always working, so at thirteen I could run a Caterpillar D7 bulldozer. I was unable to go to work for Brown & Root until I was eighteen. I had a family link to Brown & Root that caused me to know that they were the biggest and most dynamic engineering construction company in the world, particularly at that point in time.

TP: When would that have been? Early sixties?

MC: No, the summer of 1959. I worked at Old River Lock, which connected up the Mississippi and Atchafalaya. So that got followed by a series of other jobs because I always worked, starting the day that school ended until—so I worked on big earth-filled dams and other large construction projects in Manhattan, skyscrapers and things like that, most of them with companies that had some kind of alliance to Brown & Root in terms of big global engineering construction projects.

It was only after the sort of Harvard Business School experience that I wanted to go to work with B&R Builders because I could work as long as I could stay awake, and the people at Brown & Root said, "We can provide you that opportunity by putting you in the offshore area, because that works twenty-four hours a day too. It costs a lot more money and on occasion it can be profitable, and from an engineering standpoint, almost everything we do every day is new and different and interesting. So that would be another opportunity to use your brain."

Then from that followed the opportunity to be in Cook Inlet in the very beginning of the development that was one platform for Shell that had been installed the previous summer, and when we came in, we worked on the installations of two projects, the monopod for Union and Marathon. I was the field engineer operating on one of the derrick barges there, and I rode the monopod down, wrote the article in *Civil Engineering* magazine, had a cover photograph, mostly because it was kind of an intriguing single-legged platform in ice-resistant location. You have up to fourteen-foot slabs of ice that wash up and down at Cook Inlet during the wintertime, with tides going as much as 10 knots. So the only way you can withstand those forces is to have cylinders that are strong enough to just crush the ice.

Then later, another solution, there was a three-legged platform and a four-legged, and then most of the other platforms were four-legged platforms so you could distribute this load and get more deck area, as well as get some redundancy by having additional legs. So we also were involved on a four-legged platform that was sort of like a very large night table that was 90-foot centers and weighed

4,000 tons, made out of low temp and super low temp steel that was resistant to the minus-60-degree temperatures, Fahrenheit, that would occur up there so you didn't have the cracking systems, the failure of the steel based on the temperature.

This subsequent platform, it was designed to be hauled lying on its side. It was built on its side and then floated in the Columbia River and towed up to Cook Inlet. But during the period of time in preparation for setting the platform, we had to tilt this platform up. It was nominally in 120 feet of water at low tide and maybe 150 feet of water at high tide, and at the end of it, it had a 113-foot-long tube that was 12 feet in diameter that provided buoyancy for the legs.

But in order to set the platform, you had to release it, and the buoyancy of the tube created the lift. So if you flooded that, then it would fall away and unhook, and then you could pull it away with a tugboat. But in order to do that, after having made it safe for an ocean transit, we installed some vertical vent pipes that would allow the air in the tank to escape.

During a storm in Cook Inlet, the platform broke away from the side of the derrick barge, which at that point was a 500-ton derrick barge, the *Foster Parker*, that was as large as anything built in the world, and when it did, the anchor wires clipped off these vent pipes. So what happened is that this flotation tank sunk away and the platform was suddenly free in the water. So we had almost no ability to control the platform because we were, in effect, washing up down Cook Inlet steering it.

We ultimately got 7 different tugboats and about 15,000 horsepower on it, and with that we were able to, in effect, steer and get close to the original location, because the initial intent of the design was to be able to place this platform over an existing well that was on the sea floor that Mobil had been involved in drilling earlier.

During this period of time, at one point in time when we were catching these tides, which, of course, change every six-plus hours, we actually went inside the mooring buoys of a Wadeco drilling rig that was drilling a well. So this train of tugboats and stuff were a little armada that was all tied together, basically, floated by this Wadeco drilling rig that was a huge barge-type thing, and if we'd have touched it, we would have sunk it because we were made out of two-and-a-half-inch-thick super-strength steel. So it would have been the ultimate mess.

TP: This was the famous chase that was on Cook Inlet.

MC: And I was riding the tugboat because I was the field engineer. I was involved in all the steps of what do we do with what we've got, and what can we steal from other people and mobilize from Crowley [phonetic] and Foss [phonetic] that would provide us as much tug horsepower as possible.

TP: Quite an introduction to marine engineering and installation.

MC: At the time, it was the leading edge of technology, and we were spending something in the order of $48,000 a day or $2,000 an hour, and at that point in time, that was an extraordinary amount of money.

So I went offshore the next summer and was out offshore for over six and a half months. I went to work when the ice melted, and I came in when it froze and we could not longer operate. It was a great classroom. There was more happening there that was—we had helicopters crash. We had almost everything you could conceive of occur, and we and McDermott were both challenging the elements to resist both the ice and the earthquake loads. In that case, the ice loads were really a bigger challenge than the earthquakes.

TP: When did you move down to California? Was it soon after that? How long did you stay up in Alaska?

MC: I worked there two summers. I was in Cook Inlet when the ice was melted, and I lived in the office in Anchorage for the preponderance of a period of time rather than sort of a once-a-month trip to Houston for three or four days or a week, so that we were completely integrated on how we attack the following summer.

Then I came back and I worked in Greens Bayou with Brown & Root marine operators, which was the big derrick barge platform-building operation in the Gulf of Mexico, and we were fully integrated in the sense of being able to roll piling and build jackets and deck sections and do all of the electrical, mechanical, process equipment that went in the deck sections. Then that was followed by being the project manager for the Santa Barbara platforms.

TP: Tell us about this anecdote that we have in your bio about testing marine subsurface storm chokes. You had a gush of water.

MC: That was a very interesting experience. Actually, because of the fact that I couldn't work for Brown & Root until I was eighteen, the summer before that I worked for Otis Engineering, which H.C. Otis had the company, which was subsequently purchased by Halliburton. They had a facility at Love Field in Dallas, where they had a test well, and within the test well, a test well that was about 1,500, 1,700 feet deep, with about 100-foot segments in it, and they could put pressures in each one of them and they could test different things, so that you didn't spend all your times running strings in and out. You put the instrument device on the bottom and in the middle and different places, so you could optimize that.

At that point, the storm chokes were something you installed subsurface below the sea floor by something in the order of 200, 300 feet, and if the pressure above it was suddenly released due to hurricanes or something else of that nature, the storm choke would snap shut, and thereby prevent the loss of control of the well.

But my little introduction was sort of part of a game that was one where you went out and ran some tools in and you did the tests, and then you pulled everything back out again. But the first time we did it, I was sort of set up with somebody saying, "Well, we should have done this, that, and the other." And, of course, being a bright young kid, I wanted to absorb everything, and so they gave me about nineteen different steps to do, which somehow included the bottom and the top and the fifteen or sixteen intermediate hundred-foot sections, which, in essence, I did by spinning a series of valves was to consolidate this column of water. My last little effort was to take the thumb off the top of it and spin that piece open, which, in essence, was kind of like opening a Christmas tree with a live well. So water went about two and a half or three times the height of the derrick.

But probably the most interesting thing about all that was that one of the design engineers, who was either the chief engineer or his deputy, called me in at the end of the day and said, "Well, young man, you've been initiated, but you're probably going to be going to school and designing these things. Based on what we understand about you, don't ever do something that dumb again. If you go into a complex situation offshore, don't ever do anything where you don't at least believe, based on the currently known facts, that you fully appreciate the ramifications of every step that you make, and until you have that knowledge, you don't deserve to be an engineer. You may kill yourself if you'd like to, but don't do it to the rest of us." Fairly sage advice.

TP: Especially in light of the current context.

MC: True. True.

TP: Tell us about your work in California, designing the earthquake-resistant platforms.

MC: They were interesting because they were earthquake-resistant, and they were interesting because they were in around 225 feet of water. But equally, the three platforms allowed the drainage of a relatively shallow hydrocarbon reserve that was, in effect, an ellipse, and these three platforms were sort of at one-third points in the ellipse.

Probably from the standpoint of installing the platforms, we built the jackets, we figured out how to get them through the Panama Canal, took them up, lost them in the conventional manner, upended them. I was using a 250-ton derrick barge at that point, the *H.A. Lindsay*, and we didn't set the deck sections that were in sizes that that particular crane could lift and set in the fill-in spots.

But from a development standpoint, one of the things that was really interesting is each one of these platforms would take about sixty wells. There were thirty-six vertical wells in a three-by-twelve matrix, which were drilled by a vertical drilling rig, but there was also a slant drilling rig that was specially

designed to be able to drill at about a thirty-degree angle. So on both sort of what you might describe as the east and west sides of these platforms, you were able to get wells that entered the sea floor that already had a meaningful angle, and then by whipstocking, you could extend them out and effectively be able to drain the rest of the reservoir.

TP: These platforms were for which company, again?

MC: Union was the operator. Union, Gulf, Mobil, and Texaco were the participants. They were nominally equal, but I think that Union had 26 percent.

TP: And you were there when the blowout happened?

MC: Right. Each of these platforms was about a half a mile apart. So we were working on the middle one, and the one next to us had the blowout. I was not actually out there on the platform at the time of the blowout, because I think that the well kicked and they lost control of it sometime between say four-thirty and six o'clock in the morning. They had the well kick, and they were trying to figure out how to close it off, and they ended up, in essence, dropping a drill string as in the heavy parts from the bit up and the collars freely to the bottom of the well, and then using the blowout preventers. But the problem was that given the casing program they had, there was a zone at about 1,500 to 1,700 feet that became pressurized by the hydrocarbons coming up the well, and they were rising and then suddenly they were stopped by the blowout preventer system. So then they traveled horizontally and pressurized the reservoir at this basically very shallow depth, and then that bled out into a gigantic gas bubble next to the platform.

TP: The well lost integrity.

MC: Yes. The top two strings of casing were fine, but what had happened was that as you went down, you hadn't cased off this other zone that became pressurized. It was a low-pressure zone. Because, you know, in the Santa Barbara Channel you can actually see little gas bubbles bleed off, and if you go to the beach, there are little tar balls that are there, and it's been there since at least—we know the Spanish saw it the first time they came.

This upper zone became pressurized, and that led to the problem of trying to get back down to the bottom of the well, which led to a gigantic fishing job in order to finally get to the piece that they dropped and try to screw into it, and they had damaged it so they couldn't circulate mud, so they had go down inside it and perforate it in order to get enough mud down low. The first time they did that, they stopped it for about, I don't know, thirty-five, forty minutes or something like that, and it overcame that column of mud.

So the next time we did it, we took the derrick barge and—you know these trailers that you see a lot of in California that haul liquid mud. Well, we just

covered the entire deck of the derrick barge with trailers and manifolded them all together and filled every single one of them full of very heavy mud, in terms of pounds per gallon. I don't remember the weight of the mud, but that time we did kill it.

TP: So you were involved in the killing operation?

MC: Yes. Well, we had the biggest force there. So if you're sitting there with a derrick barge that's half a mile away that's got accommodations for 150 people and communications and heliports and everything else, you're sort of naturally [unclear] without doing anything. Anytime somebody who was in the—I mean, we weren't responsible for killing the well, in the sense we weren't trying to be a Red Adair or Boots & Coots or something like that, but we spent a lot of time responding to those people in various places around the world, so if they needed a bulldozer or wanted to have something welded or thought they needed more water pumps or something, somebody like Brown & Root is good at responding to that kind of demand.

So another experience, also got involved in moving massive amounts of hay that became straw, that became blown off boats on both sides in order to create something that would float and pick up the oil. So when it got to the beach, you could pick it up with front-end loaders, put it in dump trucks and haul it off to someplace and bury it.

TP: Wow. I didn't know that Brown & Root was involved in the clean-up.

MC: Our name was Mid Valley because of the fact that we were a union operation, but it was all Brown & Root leadership in terms of the foreman, the welding people, everybody. Everybody just took temporary membership of the welding unions and the various appropriate unions.

But it was also interesting, is another commentary at an instant in time everybody was fascinated by the environmental impact and they knew that the world had been involved in one of the great disasters. Wonderful organizations like GOO, Get Oil Out, got created in milliseconds, and funded and made lots of noise and got lots of visibility. But then after that, when you looked at somebody like Scripps, how much money did they actually get to study what transpired? The money fell off very quickly for what you'd call meaningful scientific research. I wonder about that happening, and I've got a meeting set up in July with Woods Hole to review what actually happened in the Gulf of Mexico and how much funding actually goes to the people who study things like that.

TP: It's funny you say that, because I was just at a meeting with an oceanographer from Texas A&M-Corpus Christi, Wes Tunnell, and the same thing happened to him with the Ixtapa blowout down in Mexico. All of a sudden your effort—there was no more funding.

MC: Exactly. The interest just evaporated. But Santa Barbara was humorous in some ways, in an ironic sense, not that the loss of life of any kind or type, but Hartley, who was the chairman of Union, made a statement that, "Under the circumstances, we've been really fortunate that nobody was hurt or injured, and all we've lost is a few birds."

TP: That was a P.R. disaster.

MC: But they were looking for some little subjective subordinate clause that they could stick in there as a headline, and they did. But even in the birds, the cormorants would preen and ingest and die. The seagulls said, "You know, this stuff doesn't taste any good. We're not going for it." So they flew around and had a good time. The seals and the sea lions seemed to get along just fine. They actually picked up a whale off of Oregon and took it into the University of Oregon in order to do an autopsy, and found out that he was probably chasing a good-looking whale and had heart failure. Had nothing to do with ingestion of oil. Of course, in their migratory routes they frequently pass through that way.

But we even had a seal that lived on one of our tugboats, where we actually had to take her into the zoo afterwards. The tugboats, because of the fact that you run anchors, deck anchors and things like that, so it was easy for a seal to hop up on it and sun, you see. Would like to get out like they could sit on a buoy or something like that.

TP: You couldn't get rid of her?

MC: Right. No. Well, what would happen is these guys would have free time and they'd catch a fish and they'd throw the fish to her, and, of course, it didn't take long to get used to the idea of room service. If you get room service for a couple of months, you say, "Why would I go ashore and have to swim for my own dinner?"

TP: That's right. Let's move on a little bit. So after—

MC: One other thing, since we're documenting things in history. One of the things that was intriguing is I had another one of my experiences, and as we know in engineering, usually you learn most from things that don't work perfectly. We dropped a 250-ton deck section and almost sunk the barge that was carrying it. It was a failure of one of the slings, which then unloaded the other three slings because they immediately became overloaded. So that was another interesting experience, because you're not supposed to drop things that weigh 250 tons. In those days, a 250-ton piece of steel was a big piece.

TP: You have the two derrick barges with four slings and you're moving the deck over.

MC: Right.

TP: One of them dropped and so the whole thing went?

MC: In this case, I only had one derrick barge, but, yes, today it's not uncommon to have two barges lift something that might way as much as 10,000 tons, with two cranes that can lift 5,000 or 6,000 tons, and somebody gets the heavy end and somebody gets the light end. Of course, you can analyze all of that fairly well and you can even weigh things pretty easily, but it's hard to find the center of gravity precisely. Of course, if you pick up anything, the center of gravity is going to be underneath the hook, and whatever it is, it'll always happen because it's just the law of physics. Of course, if that happens and you've missed it by some slight amount, you can sharply increase the load on a single sling, which happened in this case, probably.

TP: But it didn't sink the barge?

MC: No. But the barge was 16 feet deep, and one of the legs penetrated 14 feet into the barge. So it was a big mess.

TP: Wow. That was really close.

MC: Exactly. We could have sunk the barge pretty easily too.

TP: So tell us a little bit about the North Sea. In '71 you were assigned there during a real—

MC: Actually, I went over there in the first part of '70. It was just at the point in time where Phillips was interested in a production system to sort of test some wells on a long-term basis, and we were also trying to figure out how to survive during winter, because no one had ever tried to stay in the upper North Sea and work all the time. Even organizations such as the Royal Navy, with today's big aircraft carriers, you might be 60 feet off the water, but nobody seeks being in the center of those storms. They intentionally get out of the storms, and even with the fisherman from places like [unclear], you either survived and came back with stories that nobody believed or you didn't come back.

So the interesting thing is, two things happen that parallel. One, Exxon, or Esso-Norway, their Norwegian subsidiary, had installed an oceanographic wave-recording buoy off the Norwegian coast, so we were going to get a nice series of wave-train analysis that would have helped us begin to appreciate the typical sort of North Sea winter, at least one that went by that time.

Now, independently of this, I was taking models of the *Hugh Gordon*, which is a 400-by-100 foot vessel and we built the model at the National Physical Laboratory that is there by Heathrow, that probably still is the largest tank facility in the world, at least in that hemisphere. We have some things that compete with it, of course, in the U.S., but they have a tank long enough to where they have to correct for the curvature of the Earth because the water surface is not straight. They can operate models of million-ton tankers that might be twenty-five to thirty-four feet long, and drive them along the channel.

In any case, what we were trying to do was to determine what would happen with our vessels if we were out there in fifty-, sixty-, seventy-, eighty-foot waves, and would we flip upside down, being simple about it. Well, we did establish that it would be quite a ride, but we did intriguingly establish that just given the nature of the way the barge was designed, like a bar of Ivory soap, you could make gigantic waves in the bathtub, but it would not turn upside down.

But the shocking thing that was interesting about this wave-recording buoy is that about April they went out to get it and everybody was enthusiastic about learning what had really happened, and we found, to our intrigue or surprise, that on some date like October 27th, it had jammed at the maximum wave it could record, which was 20 meters, and it's recording of a wave meant there was no air in the wave, so it was solid water at that point. It was none of the fluff that's on the top of the wave that doesn't produce the full force. Of course, a real live 60-foot wall of water led us to sharply improve our appreciation of the environment that we were confronted with, because if that happened in an October storm, what happened during the rest of the winter?

TP: This was in designing which barge again?

MC: The *Hugh Gordon* was being tested for stability, because it was going to be our principal construction craft because we needed to be able to have a good-sized crane. It had a 250-ton crane at that point. But to be able to lay pipe and make the associated connections so that you could—they knew that the Ekofisk Five was massive, but they needed to better appreciate the production characteristics of the wells in order to be able to fully develop an integrated design that incorporated the ability to extract all the hydrocarbons effectively. Pete Silus [phonetic], at that point, was in London running the Phillips—and, of course, later he ran Phillips.

TP: You also were involved in Statfjord, is that right?

MC: Statfjord was probably, at that point in time, the largest engineering construction project ever done offshore, in the sense that this was in the late seventies. So let's say we take a 1980 dollar. It was a two-billion-dollar project that would produce 300,000 barrels a day of oil. It had the ability to store more than a million barrels

of oil underneath it, because it was one of these gigantic gravity concrete structures. It would have a huge distributed load on the sea floor. So you didn't end up with the conventional foundation installation of piling or something of that nature. You were taking it, loading it, and using that as a way to compress the sea floor, and then make it uniform.

It did lead to some interesting experiences, though, because if you are dealing with this animal before you take it offshore, you build it in the fjord. So it might be drawing 200 or 300 feet of water. So you can get inside it in a little rubber boat because the bottom is open, and be inside a cavern that makes the inside—I mean, you could have taken the Astrodome and stuck it under there and there would have been loads of room to spare. You could have paddled all the way around the outside of the Astrodome, just as an example.

It had six and a half million man-hours of hookup. If you just translate that into people doing something, that's the amount of hookup work that occurred offshore, because it was the first time we really had a situation where you were designing integrated deck systems into combinations and heliports where you, for practical purposes, almost had unlimited space compared to what you were used to, which was usually a little rectangular thing where you were stacking things, and you were very, very busy trying to analyze how to have all the pipes and cables and instrumentation all work without interfering.

TP: Before the modern era of facilities engineering.

MC: Exactly. Before you were able to do all of that on a CAD [computer-aided design] screen and pick forty-seven colors, make them anything from compressed air to diesel fuel lines to a standby generator, and be able to run a computer program that eliminates all those interference problems, and remembers that this is a two-inch pipe and that's a fourteen-inch pipe. But when you did it all with humans, it was kind of interesting.

We were just beginning to figure out things like that. I mean, the integrated critical path systems were being developed, and we had a 12,000 activity schedule for just the offshore hookup. The deck sections came from something like thirteen different locations and seven countries. Just to go to places to get the manpower to be able to assemble what we were talking about and then logistically move it to the site to be installed was a really extraordinary engineering effort, solely conceived by something that would approach it in a nuclear industry or a massive military facility like Diego Garcia. But Brown & Root did those things anyway, so in terms of systems of trying to figure out all those things, we were on the leading edge of people who could do things like that. Even though we always knew we wanted to be further than we were, but every time we got a project, we intentionally pushed it forward.

The same thing with a tension-leg platform that Conoco did [unclear]. Dennis Gregg [phonetic] was involved, and we intentionally sought to get that job

so we would have that experience because we realized that if you could have a little tension-leg platform in shallow water in a relative basis in the North Sea, then you could put the same thing in one, two, three, four, 5,000 feet of water later. You just upped the size of things, which is to some degree [unclear]. Some of these engineers had also been involved in Mohole, the intent to drill and penetrate the Mohorovičić discontinuity, which was a very interesting idea. About the time we figured out how to do it, once again, the government noticed they hadn't had enough money to do it or it wasn't politically popular.

TP: So you were mainly in Norway with Brown & Root?

MC: I was in London two times, once in '70, '73, where we were doing the more conventional work, but getting ready to do BP Forties. Then I went to Singapore for three years and was involved in something for Exxon's Malaysian subsidiary, Esso-Malaysia, the Timbuco [phonetic] Platform, that at that point was the deepest thing ever built in Southeast Asia or Australia. I think it was 328 feet, which not much, again, today, but at that point in time there wasn't anything more than 150 or 250 feet. Most of the work we were doing for Shell in Brunei, Sarawak, and Sabah was much shallower than that.

So then when I came back in the '76, '80, that's when we really started looking at and executing these massive concrete gravity structures that also allowed storage. So when you actually did get hooked up to a tanker, you could load it at good speed so you could at least benefit from weather intervals, where when you did have a period of good weather you could get somebody loaded and out of there in a reasonable period of time. Because your other great fear, of course, was you could be loading some big tanker and it could bump into something or you could become disconnected.

Politically we were under a lot of visibility there. I mean, there was a really interesting newspaper called the *Dagbladet*, and the *Dagbladet* managed to use a helicopter to fly around and get a photograph in a position where the platform was in front of the flare that was burning. So the superficial impression was that the platform was burning, which, of course, it wasn't, but they had that photograph, so as soon as there was a problem, they were able to put that on the front page of their newspaper. From the point of the view of the audience, it looked great. In a certain case, as we all know, flares are like big Bunsen burners a long way away from everything. So in general, they're put someplace that irrespective of wind, etc., they shouldn't create a problem. But this was a beautiful execution of instant visibilities by the media. And that's their business, is gaining attention by being provocative. You have little periods of time where you're exposed, and then they find something else to focus on.

TP: Those big gravity structures, that was a specific era in the history of this industry.

MC: No question about it.

TP: I guess they were more built like the Troll [phonetic] and so forth for the North Sea, but they don't really do that anymore.

MC: No. Well, there are other more sophisticated ways of doing it, and by subsea systems you can optimize the location of the wells that you're drilling, and thereby be able to more effectively drain the reservoir. In this particular case, you had a huge structure that was weather-resistant and provided you a lot of area. It gave you the ability to store. You had very high levels of production, but you had a very complicated drilling problem because you were really only drilling from one location, and in those days, as I said, in 1980 it was 2 billion dollars, 300,000 barrels a day. You can put that in today's money and that's a massive amount of oil coming out of something by any measure. In those days, you didn't have the directional drilling techniques available that you do today.

TP: How many wells were on one of those structures?

MC: I've forgotten. Somehow I remember—you know, we talk, as engineers, about the number of wells, but that's to allow for subsequent development if somebody wants to go 5,000 feet lower and geophysics gets better and things of that nature. So I would say, as a generality as an engineer, I would say there's about 50 percent more slots than they expect to use. Based on the effective drainage of that particular reservoir, I would say, if I remember correctly, this thing could drill something like forty-four wells. So each individual well had extraordinary production rates, much as you see in the deep water Gulf of Mexico.

TP: I wanted to reserve some time for you to talk about Intermarine, Incorporated.

MC: Intermarine, Incorporated sort of fell out from the fact that I had this interim period of two years where I was head of strategic planning at what was then the world's largest engineering construction company with annual sales of 6.5 billion dollars, almost 100,000 employees, operation in excess of—

TP: A hundred thousand employees?

MC: About ninety, at its very peak. But after you took something like R&B Builders, we had 85,000 just in that. Of course, we were one-quarter of that joint venture, per se. So we would have only had 20,000 in it. But you go build massive facilities like rebuilding Guam or Diego Garcia, or go build yourself a couple of nuclear power plants, and at that point in time we were building the twin units at Glen Rose, Texas, and we were building the twin units down here. So you had four nuclear power plants that were all Westinghouse pressurized water reactors,

two 1150s up north, two 1250s south. So you had a very large number of people. But equally, I could see the beginning of the environmental shift in the United States, where the legislation had created a set of circumstances where the massive engineering construction projects would probably not continue to transpire based on the environmental rules.

TP: I guess it was still the oil boom in '82.

MC: Yes. As a result of this sort of overview, I realized that there was an opportunity there because oil was commonly perceived, at that point in time, to be going to as high as $100 a barrel. I had gone to school at Harvard Business School with Matt Simmons. We were in the same class. So I went and had lunch with Matt and said, "What have you got that's interesting to buy? Because I'm not sure that my current employer has a meaningful focus on where they want to be. And since I'm head of strategic planning, I have insights that other people don't have."

So I ended up buying a boat company that ran offshore oil field supply vessels that was very similar to the aspects of Jackson Marine, which was our main subsidiary. This company was slightly different in the sense that there was some focus on operating vessels where you could differentiate yourself by being able to have your client live on board. So you ended up with the focus of being responsive to people in the geophysical business. We had a couple of boats working for Grant Geophysical. We ended up with Schlumberger as a very, very important client. Schlumberger was very parallel, if not concurrent, to Halliburton, in terms of their ability to pump cement and/or acid and other [unclear] from marine vessels, and it allowed me to completely detach myself from my former employer so that I couldn't be construed as living or surviving or existing because of patriotism for our old friendships. And we did work for Oceaneering and other people. So your client was living on the vessel and you were customizing the vessel to some greater degree to respond to the clients needs.

We also did a lot of saw boring work or provided a platform for people who did saw boring, and that's extended all the way to working for all the Dutch dredging people. So if you see any islands around Dubai or those places, it's almost a certainty that we've been involved in doing all the saw borings. We've worked out a way to do saw borings on fifty-foot centers and pull twenty-four, twenty-five cores every twenty-four hours. But then again, when you're looking at sucking up square miles of the sea floor in order to build islands—

TP: So it's a real multi-service marine transportation company.

MC: Yes. Right.

TP: Not just servicing the offshore industry.

MC: Right. But we also can move a row and jack-up and tow it up to Saudi Arabia or we can operate off the kingdom in Kuwait and move conventional jack-up drilling rigs, or we can go down to Mozambique and work with a semi that belongs to Transocean in 1,500 feet of water or something like that. We do know how to do that, but we have a lot of other things that we can also do, and because we have vessels that tend to have higher levels of accommodation, we've been able to respond to people like that.

TP: I thought it was interesting you said your most significant offshore accomplishment was taking a chicken boat company and forcing it to survive for thirty years in spite of the market and competent competitors.

MC: When the company was started in 1982, I was able to finance it with almost no equity through a meaningful loan and an even larger subordinated note that I believe is probably mathematically the largest leveraged buyout that I've ever heard about in history, in terms of percentages. I did go to Harvard Business School, and Matt Simmons did have some experience in structuring things. So you could make a case that we got away with murder, but then we survived and a lot of other people didn't. Part of that was just being intimately familiar with what every one of your clients did. Because of graduate school at Stanford, I understood the world of geophysics, and I'd grown up in Dallas, so Cecil Green and all the people that created Texas Instruments.

TP: GSI, yes.

MC: GSI. I grew up knowing all those people, and my father going to MIT, and so there was all that cross-linkage. There was the linkage of what could you do with the diving and the oceaneering people.

TP: So you started this company right before the industry went into a big dive in the mid to late eighties.

MC: Right. That's why I was able to get the financing to purchase it. But if you're operating almost exclusively outside the United States and you've got Arthur Andersen auditing you, so they probably believe the numbers. At that point, that was without dispute. Today we use PWC as a successor, but in each case it was the largest in the world. At least we could demonstrate that we could produce as much discretionary cash flow to contribute to overhead or profits or to debt for the asset than anybody else could, because the big public companies, of course, that information was usually available. In our case, being private, it wasn't available, but you could demonstrate to a lender that if they took it away from you and gave it to somebody else, they couldn't make any more money out of it than you could.

And if you put that together with the fact that inherently we've worked in about forty countries now, so because of my living foreign for ten years, each new country was sort of an intriguing experience. So I'm now, in general, limited to countries that have saltwater and hydrocarbons, while with Brown & Root you could go anyplace.

TP: You're still chairman today?

MC: Yes. The company is active, and had a meeting this morning, before walking in here, with my Middle East manager and with a consultant, who's a twenty-year Coast Guard guy, who's worked for the largest publicly owned company as well as ours, and will be there at the dinner this evening.

TP: Still working twenty-four hours, it sounds like.

MC: I'm having a lot of fun. I'm very interested in science, so I have a lot of other interests.

TP: The last thing I wanted to mention—we could talk all day, but we have limited time—I think you're the only Hall of Fame inductee who's had an asteroid named after him.

MC: That's probably true. But again, that's still back to science. A lot of people make scientific-type judgments, and frequently I look at them and say, "Did you enjoy mathematics?" Of course, the answer is always yes. So I say, "Did you have fun finally getting a hold of differential equations?" And their mind goes blank, because most people don't know anything past the calculus. You say, "Well, I guess that didn't include partial differential equations or second order of partial differential equations." So you can tell that they couldn't track an asteroid. They also would be unable to be involved with submarines. Of course, I was the commissioning chairman of the U.S.S. *Texas,* so the same math applies in terms of what we do under water as what we do in space.

I am involved with the Harvard Smithsonian in terms of astrophysics as well. I know several people who are National Academy of Science, but that's just because I'm lucky and because of Brown & Root doing a lot of interesting things that other people didn't do.

You find since, we're going to make a historical statement possibly, that very intriguing things happen that you need to go back to the water. I'm involved with a museum that's an archeology museum that's 110 years old, where the Society of American Archeologists was created seventy-five years ago. One of the people on my committee is studying El Niño and La Niña to better comprehend what's happening in the ocean down there, and he's doing this by taking saw cores in the northern Peruvian desert and doing a pollen analysis. It's

a little short-term study for the last 7,500 years. But then after that, I came back down here and I said, "You know, it would be fun to call our friends up at A&M and ask them some silly questions for a little while," like, "Are you guys still drilling in the ocean? Do you still know where you are? Are you still drilling a lot more sediments than metamorphic or igneous rocks?"

Of course, at this point in time they say, "Marshall, you've been here. You know what we do. You've seen the warehouses."

And I say, "What do you all have in pollen?"

And he said, "Well, how do you have sedimentary rocks and not have pollen?"

And I said, "And pollen doesn't deteriorate, does it?"

And he said, "Well, of course not."

And so I said, "How old are your rocks? How old is the oldest one?"

And he said, "Well, I don't know; 325,000, 350,000 years old or so."

And I said, "So therefore, for somebody who's not too intelligent, we could say you could take a quick look at global warming for a third of a billion years on a planet that's about three and a half billion years old."

And he said, "Well, yes, certainly if you had a politician that was interested [unclear]."

So from the National Science Foundation and, as I said, I'll be up at the MIT place on the Cape that plays with oceanography, and we'll see what hopefully we'll be able to learn about hydrocarbons in the Gulf of Mexico and their attrition. A subset of that that's interesting is that in the *New York Times* about two or three weeks before that—you know how they have the Tuesday science section—there was an article about why is there such good fishing in this strip that goes out from New York City. The reason, of course, is there's this gigantic rift valley, and in a rift valley the methane bleeds off and creates little bubbles, and everybody eats the bubbles, and as they get up to the surface, people catch fish, and that's the best place to go catch fish.

TP: That's interesting. I think we're going to have to conclude here. I appreciate your giving us the time, and again congratulations on your induction. It seems long overdue.

MC: Thank you. Honored to be included in a wide group of competent, gifted, driven, capable achievers. Thank you.

TP: There's been quite a few Brown & Root people made it into this.

MC: Yes, but I did go to school at Berkeley, so I did know about Scripps, and I did know about Mohole and all of those things that occurred.

TP: Very good. We'll stop here.

[End of interview]