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Interviewee: Marshall, Peter
Interview Date: September 21, 2002

OFFSHORE ENERGY CENTER ORAL HISTORY PROJECT

Interviewee: PETER MARSHALL

Date: September 21, 2002

Place: Houston, TX

Interviewer: Dr. Joseph Pratt

Side A

JP: This is an interview with Peter Marshall in the OEC Hall of Fame. The interviewer is Joe Pratt. The date is September 21, 2002.

PM: I interviewed for Shell and NASA as my two top choices and got offers from both. Bob Bee, who was in the class ahead of me, had written back to one of his professors about how wonderful it was to work for Shell. So, that influenced my choice. I later realized that the whole year when he was writing such glowing reports, he had just been on the training program. 1962 was when I came to work.

JP: You graduated with your masters degree in 1961?

PM: I graduated in 1961 and did six months in the Army and then I went to work for Shell.

JP: When did you get the Ph.D.?

PM: 1990.

JP: How did you end up in Japan?

PM: Working at Shell, I developed quite an expertise in welded tubular connections - the way you weld offshore jackets together. One of the other world experts in this was Yoshi Kurabani, he had been at the University of Texas when they had the shooter in the clock tower and was amazed that ordinary citizens whipped out their guns and started shooting back! So, he was interesting . . . I mean, welcome to Texas!

He was another researcher in this area, and our expertise in the area grew over the years. He was one of the few people that I thought could supervise a Ph.D. in that area. In Japan, the system is that after you finish your master's courses, the Ph.D. is just research. So, I wrote a dissertation for Professor Karabani and it ended up being commercially published . . . under 1,000 copies, but that is not bad for a scientific book.

JP: Did you go to Japan to study?

PM: I wrote it here in Houston while I was working for Shell. Professor Karabani and I would go to a lot of the same conferences on tubular structures, so we would meet at those conferences and discuss the progress on the thesis.

JP: Have you taught since then?

PM: Yes. I retired from Shell in 1993 and taught three years at the University of Newcastle Upon Tine in England. is basically an engineering and medical school but they have all the other departments so they can call themselves a full university. It is a pretty serious engineering school. Its other reputation is that Newcastle is one of the ten top party cities in the world, along with New Orleans and San Francisco; those were the only two from the U.S. I never saw the party school side of it, except that some of my students sometimes looked a little hung over!

JP: University of Florida ends up high on that list when they do colleges these days!

PM: Yes, it always has. I remember the year they were in the Sugar Bowl not too long ago. I was headed back to Florida and a bunch of University of Florida people were headed towards New Orleans and we ended up at the same hotel. They were the same beach bum, flip-flop crowd that I remembered from my undergraduate days. Of course, they might have been the same guys!

JP: Your information says that you started in the Louisiana swamps at Shell. What was that like?

PM: The training program? Well, my first day at work was the big freeze in 1962. I went around with a gauger and we were trying to unfreeze the gas production facilities so that Shell could deliver the gas which was desperately needed by people trying to stay warm. So, I had an interesting initiation.

Then, after I had finished my production training, I went for drilling rig training on an old steam rig - Shell Rig 3. It was a barge-mounted steam rig that was originally built in the late 30s and still running in 1960; I was on it. The last well I worked on and the whole time I was there which was 8 weeks, they were trying to solve an underground blowout problem.

JP: Was the training program in New Orleans?

PM: Yes, it was headquartered in New Orleans and then the experiences out in the swamps were my field experience. Then, I came back to the offices in New Orleans and had a week or two in different departments to see how the whole company worked. And then came to Houston for training at the Bellaire center. It was my first time in Houston.

In 1962, interestingly enough, Chimney Rock Road was practically the end of the world here in Houston.

JP: When I came here in 1966 to go to Rice, it was a different place.

You said that one of the interesting things about your career with Shell were the early days of the head office design group. What years are you talking about?

PM: I worked in the offshore division after I finished my training program, doing field engineering; caissons, top sides, and things like that. And in late 1964, I transferred into the central design group which was part of the New Orleans area under Dean Cox. They were just starting to design deep water platforms. The engineers, besides myself, were Bob Bee, Jimmy Mayfield, Jean Stroback . . .

JP: When you say, "deep water," how deep are you talking?

PM: Well, deep water then was 285 feet. Gene Stroback designed the jacket. I designed the deck for that one; that was the first world record that I had for water depth.

The platform was installed in 1965. Shell's construction superintendent was a very brave man in that he elected to do all of the work on day rate rather than fixed price and let Shell do the planning instead of the contractor. We came out ahead except on this job. He accepted the platform before a hurricane, even though it had not been painted out yet, because he wanted to get the derrick barge off the payroll. Had he kept the contractor on the payroll, the loss would have been on his insurance. But, it ended up being on Shell's insurance, or the guy that caused the wreck!

What happened during Hurricane Betsy is that the Blue Water 1, Shell's pioneering semisubmersible, which had capsized one year earlier in Hurricane Hilda, had been bought by a salvage operator and was still moored out in the Gulf floating upside down. During Hurricane Betsy, it broke loose from its moorings, got tangled up in Shell's brand new platform, and then went over and wiped out a Gulf platform. Pieces of the rig were found in both platforms. I Think our insurance company finally collected from the entrepreneur who had bought the rig, who was John Meekham, also the owner of The Saints.

JP: So, it was Bluewater l's revenge, I guess!

PM: Well, the Shell platform did not completely collapse.

Four of the eight legs were knocked out. I still have a picture at home of the deck hanging on four legs - there were three missing from one side, so it was hanging kind of lopsided. The big puzzle was how to take the deck down. It had been put up in three pieces at the limit of the usual offshore trains and the only way to get it down from that precarious position was to take it down in one piece. So, McDermott rigged up their sheer leg which could lift 800 tons; that was the heaviest lift. We went right up to their capacity and got a new world record for heaviest lift taking the deck down.

JP: So, you had three world records: you had the water depth, the deepest platform ever wiped out, and the lift! That is pretty good for a young man!

PM: I had one more experience on that platform . . .

JP: What was the name of the platform?

PM: West Delta 133. We did not start the clever names until later. I had one more experience on that platform. A couple of years later, the operators of the Star 1 submarine . Westinghouse, I think, owned it . were trying to promote its use for nonmilitary applications including platform inspection. So, I did a dive in the submarine to look at the underwater wreckage of the platform. I was pleased to notice that Shell's design for tubular joints held together, and the members that failed, failed out in the middle of the members rather than in the connections, which was, at the time, different from the experience of most other operators. A lot of the jackets that failed in both Hilda and Betsy came apart at the connections.

I still have a piece of sculpture from one of Shell's older designs that came apart at the connections. A strip was peeled down the jacket leg by the failing brace and the brace was twirling around in the waves and curled the strip up just like a gigantic shaving from a machine. I had a welder cut it off and mount it on a base and it became a piece of art that was exhibited next to one of Paulter's at the Menil Museum in one exhibit.

JP: What did you name it?

PM: Well, the Shell vice-president came up with the name of it, "Hurrican," in Yucatan language. He was the one that promoted its exhibition.

JP: You said that you designed the deck on this platform?

PM: Yes.

JP: In your material from this same period, I have a notation about the collapse studies in 1964 and 1965. What were those?

PM: Well, one of them was this well jacket that the sculpture came from. We did an after-the-fact analysis using our then current understanding of tubular joints; the problem was not to explain why that one jacket failed, but why one-half dozen sister jackets of the same design survived. We found that tubular connections had a lot more strength than we were giving them credit for. That was one of the impetus' of the research that led, almost 30 years later, to my Ph.D.

JP: Is that the kind of insight you start with to move towards this costjrisk trade-off?

PM: Yes.

JP: How strong do you have to make them?

PM: Yes, and how much stronger are they than you think they are?

JP: Help me with this as a nonengineer: are the implications that you do not have to make them so strong?

PM: No, we ended up using that calculation, the cost risk trade-off, to justify to Shell and then later to the industry . and it got into API/RP2 . . . an increase in the design criteria from Glen's old 55 feet wave to roughly a 72 feet wave as the design wave. The argument was that you would save enough in future losses prevented to pay for the incremental cost of designing for bigger waves.

JP: Obviously Betsy, and later Camille, made people rethink what had been thought for 20 years about what a big wave would be - how high and how often or what the design implications were - could you talk about that in language that could educate people about the role of engineering in anticipating the impact of hurricanes? Each time of a big hurricane taught you what you did not know.

PM: Well, the wind and wave technology that the oil industry started off with was that which was developed during World War II to support amphibious invasions, to get good predictions of the surf conditions when we were trying to put troops ashore.

JP: Who did that?

PM: A lot of that was done at Texas A&M; a name that comes to mind is Brett Schneider. Then they extended that to the problems of offshore structures and had a working solution to the problem in the early 1950s.

JP: When you say "offshore structures," is that mainly petroleum-related?

PM: Yes, petroleum-related. There have been some lighthouses built of that design. Actually, some date back to the civil War, but they are a different technology. They look like modern jackets - they are tubular and they are slender members, but they are wrought iron instead of welded steel.

JP: And those are in the ocean or on the shore?

PM: In the ocean. They are usually sitting on reefs; they are used to mark the reefs. In fact, National Geographic once had a write-up on the one in Carries Fort Reef in Florida. It is in a marine preserve now, but during its history the lighthouse had actually been attacked by Indians once, or the crew had when they went ashore for vegetables. But there are modern light structures built like our petroleum jackets. The real thrust for developing that was the offshore oil.

JP: So, you had this data from World War II, this impulse to say what are the waves and when? And then you start putting platforms out in the ocean and you had better know more?

PM: Yes.

JP: Are there landmarks that you learned about before you went in the industry about that knowledge?

PM: Well, there is a wonderful movie called Thunder Bay. They show it late at nice every once in a while. It has Jimmy stewart in it and he builds the first modern offshore platform in 1947. They have the visionary president of the company that wants to do it and his accountant that is saying, "Hey, this is way too expensive!" And they are fighting local opposition groups and government bureaucrats and the environmentalists, even in 1947. The climax of the movie is when he has a fist fight on the boat landing during a hurricane with one of his opponents. The happy ending is when they have a gusher which, of course, is oil going all over the Gulf of Mexico! I showed that movie to my students at the University and they enjoyed it. It was recorded off a broadcast so it had commercials in it, too, and I think they enjoyed the American commercials as much as the movie itself! So, where were we?

JP: When you started doing this and you had Hurricane Betsy to work with very early on in your career, you said that the 55 foot wave criteria was in place by 1972. Where had the 55 foot wave criteria come from?

PM: A number of oceanographers worked on it. Brett Schneider did develop the methodology for taking a look back at historical hurricanes. A consulting oceanographer/meteorologist in New Orleans, Al Glenn, actually put the classic study together in about 1958 or so that resulted in the design wave height that people started off with. The industry decision to use Glenn's 100 year wave came very close to solving the problem.

A lot of platforms that failed in the early days were older designs that were made without the benefit of that technology, like the Jimmy Stewart platform and some that had been designed for what is called a 25 year wave; managers thought that would be safe enough because they were only planning to leave them out there for 10 or 20 years. In other words, if you leave a platform out there for 20 years, it is only designed for a 25 foot wave and it has something like an 80% chance of having its design wave exceeded. They did not actually understand the level of risk they were taking. They almost thought it was a guarantee that they would see such a wave for 25 years! Even when designing for a 100 year wave, when your platform is out there 20 years, there is something like a 20% chance its design wave will be exceeded. But, because of what we learned about the reserve strength of the platforms, the chance that it would actually fail in such a storm is down around 1o. When you do the economics, if you can get your platform risk from a one percent annual risk of failing to one-tenth of a percent, one in one thousand annual risk of failing, it is worth the money to do that.

What prompted the increase in criteria is that in the 1960s, there was more research done on oceanography. People started measuring forces on platforms. Some platforms were instrumented to measure their force. Some wave force measuring projects were set up and it was found that the old World War II, Brett Schneider/Glenn oceanography was a little on the low side. So, all of a sudden we had new technology saying, 'Hey, the waves are actually bigger than we thought they were,' and then we were faced with, 'Well, it is going to cost a bundle to design for these bigger waves - do we really need to do it? Is it going to be worth the money?' With the risk of having platform failures, you put a dollar value on that . . . you lose the platform, you use the facilities, you may lose your wells, you may lose some oil, you lose a lot of time if you reconstruct it, or you may lose all the oil in the ground if you do not reconstruct it. Those costs add up to five or ten times the cost of just the platform.

So, there is a big financial risk for failure. Even though it is a small probability and it is in the future and therefore, you get to defer it with interest rates, it still adds up and could be used to justify an increase in design criteria and the resulting increase in platform costs.

That was done as a formal study in Shell in about 1972. It took a while to convince management that we needed to spend the money; that was about 1974. And then, it took a while to convince the rest of the industry to make that the standard; that was in about 1977.

JP: You said there was new technology to estimate the height of wave. What kind of technology was that? What did they use before and what were you using by the 1960s?

PM: Well, what they used before were curves and equations based on measurements of waves. What we use now are computers to forecast the waves from the moving wind field of the storm.

JP: With the computers, can you model it more?

PM: Yes. In the late 1970s, Shell developed a hindcast model that modeled the wind field and the result waves for every hour of every storm that has happened in the 1900s, the last century. So, you can get a fairly accurate reading on what the likelihood of exceeding a certain design wave is.

JP: What is the closest to an actual measurement of any extreme wave length?

PM: Hurricane Camille was one of the most intense storms that ever happened and it ran right across an instrumented Shell platform. The platform was designed for 55 feet waves and we measured an 80 feet wave with the instruments. The water came six feet above the lower deck level and wiped out a bunch of equipment, but the platform stood up.

JP: Wow! Why was that?

PM: Well, the reserve strength. It confirmed what we had learned earlier about reserve strength, and that is taken into account in figuring the risks; that even with this reserve strength, you are better off designing for something bigger. Raising the decks, of course, limits some of the damage that you see from the wave getting into the equipment.

JP: I was at Rice at that time. I got married and we took a honeymoon trip, we drove to Buloxi before and then about three months later, after Camille. It was stunning. I cannot imagine what it would have been like offshore. The 80 foot wave that you actually measured was over the whole platform?

PM: Over the lower deck.

JP: Over the lower deck? And the platform withstood?

PM: Yes.

JP: And that is the highest that Shell ever measured in the Gulf of Mexico?

PM: Yes.

JP: So, you know that 72 feet waves are possible; it is not a theoretical thing there.

PM: That is right, and they have been exceeded in the century, in several different storms at different locations.

JP: Walk me through the basics . . when you move from 55 foot to 75 foot and that kind of criteria, what fundamental changes do you make in design?

PM: Raise the deck. You design for higher wave forces because bigger waves are more forceful. That is about it, I think.

JP: Is there a dramatic difference in the cost?

PM: I am trying to remember.

JP: It would obviously depend on the size of the platform and all of that.

PM: Yes. It was maybe a 30% increase in design forces and a 10% increase in cost and order of magnitude reduction and future risks.

JP: The cost risk trade-off, that kind of analysis, is that something that happened in your career?

PM: Yes.

JP: . as opposed to other ways of looking at it, where you just say here is what we have to do to be safe at this level and this is more average of economic efficiency as a starting point; engineering efficiency and economic efficiency?

PM: Yes, well, the cost risk trade-offs have come in and out of favor. They are generally not favored in the North Sea; because people stay on the platforms and are exposed to the risks, they want astronomically lower risks than a cost risk trade-off. Even if you include death benefits as part of the cost, they do not think that is a moral way to do it, or adequate. And they want to set lower risk levels, higher safety factors. The difference in philosophy continues to this day. Industry is trying to write an international standard for offshore platforms and that difference just keeps popping up again and again in trying to resolve the way we do things here and the way they do things in the North Sea.

JP: Do you think that is mainly the fact that there are stronger government regulations and that they have had disasters that we have not had that killed hundreds of people?

PM: Yes, I think so. We have had structural and physical disasters on the same scale as what they have had there, but because you can just jump in the water and survive in the Gulf of Mexico instead of freezing to death, there has not been the loss of life.

JP: You can also get people off when you predict a storm.

PM: Yes. The industry standard is still to take people off when a hurricane is predicted to come.

JP: Bullwinkle and Cognac and the practical designs are important things. But, before we get to that, we were less afraid of failure back then, and the idea that there was a different sphere, an entrepreneurial sphere, in engineering in these early days. Explain that because I think that is a very important point to make.

PM: The Bluewater 1, the first of the new technology for deep water drilling, was a huge leap of faith for Shell. The fact that it failed two or three years after being put in service due to a severe storm that was larger than what they had designed it to survive was taken in stride. Shell continued to pioneer that technology. Even the Bluewater 2 was built for West coast service, and people do not believe me when I say they drilled wells off Northern California just outside of San Francisco Bay. The shore base was Half Moon Bay, which was a sleepy little fishing town. Now, it is a bedroom community for the Bay area.

JP: That is really rough water, too.

PM: It is very rough. One of those Shell rigs that drilled in the Pacific measured a 100 foot wave. That was the later rig, the Sedco design, a three-legged rig.

JP: For that, I want to be onshore! I want to be in the middle of the country when that hits!

PM: People were out there trying to work when it happened.

JP: Yes, I think I heard the story about that. When you talk about the entrepreneurial spirit of designing and engineering, it is just willingness to go see if it works. I wrote a history of Brown & Root's marine division once and they were probably the extreme version of that. It seemed almost like they planned for it to fail so they could see what was wrong, and then they would go fix it because they were always in a hurry, particularly in the North Sea. And money was no object in the North Sea in the early 1970s after the price had gone up so high.

PM: Yes. Back in the 1980s, Shell built a platform in Brazil. It was their first experiment in letting foreign oil companies back in. The Brazilian state organization was interested from two standpoints: one was how could Shell do it for one-third the cost they were doing things; and two, was what Shell was doing really safe? They gave it a very careful scrutiny and basically accepted the Shell design.

I went down there a couple of times to help with the scrutiny and had occasion to tell them about these early days of just going out there and trying it. The people overseeing the platform verification were incredulous, but if you look at some of the other things Petrobras is doing in deep water, I think somebody in that company has the same spirit!

JP: Now they do. They have learned it.

Well, even before. One of the other revolutions that was going on down there is that they had the Norwegians apply the quality control and safety concepts to what they were doing. It was revolutionary for the Latin way of thinking. I thought at the time that they have got the resources and they have got the people; if they can learn that lesson, they are going to be World leaders. And today they are supplying most of the commuter jets that you see, the twin jets that go for short rides. It is taking hold.

JP: In terms of other industries, offshore is an amazingly worldwide endeavor, particularly since the 1970s with a lot of sharing and a lot of cross-fertilization.

PM: And the reliability thing. I can remember that in the 1950s when you bought Japanese, you were buying cheap stuff. The guy from AT&T who developed quality control for telephones went over there and taught them . Thierry Demming he became a God in Japan! And now, their situation is reversed. If you want quality, you go to Japan. But it is all based on a statistical theory of how well do you know that what you are going to do is going to work?

JP: We will use the rest of the time to talk about the evolution design through Cognac and Bullwinkle as you go deeper and the understanding of how to build a fixed platform and launch it. Are you involved in both of those?

PM: Yes, well, let's pick up with the West Delta 133 platform.

JP: Walk through the broad trend.

PM: The replacement platform of the same design was installed by Brown & Root instead of McDermott. During the launch of that platform they broke the back of their launch barge, but the platform got off okay. The idea is to build the jacket on its side, load it on a large barge, ballast the barge so that it is sloping down towards one end, and then slide the structure off that low end.

When we built Cognac, the launch barges had not gotten much bigger, so in order to get it in sizes that could be launched we built the platform in three pieces. The base piece was actually wider than it was tall, so it was built standing up and launched standing up. The other two pieces were built and launched on their sides which is the conventional way. The pieces were lowered to the floor on a heave compensated winching system, which was revolutionary in its day; it was very complicated and was never used again!

It was a very complicated project but was successfully executed. Cognac led to a step development in our understanding of the dynamics of platforms and the use of random waves to design them. By that time, the design group had become part of head office. Initially, it was still in New Orleans, but instead of being attached to the New Orleans area it was attached on paper to head office almost in the same office building . . well, actually, it was separated from the rest of Shell by the Petroleum Club. So, we almost had our own little domain down there and did not report to anybody local.

Bob Bee was the leader of the design group at that time. I think it was our golden age. We developed designs for deep water offshore California, thinking that we would find something commercial with the drilling we were doing out there in the late 1960s and then develop some tools for dynamic analysis and random waves. I actually designed a 600 foot platform in the 1960s that would have been for where Exxon built their Hondo platform, but Exxon got the lease so they got to do it.

That technology was in place when Cognac came along and was refined because now that one was actually being built, Shell put more resources into looking at the problems. The initial design for Cognac had a fatigue problem and a fatigue analysis method was developed to screen alternative designs rapidly. The platform was basically reconfigured by changing its geometry to make it work better in fatigue. It kept the same 400 foot base width and a fairly small water line. We arranged things to make the wave forces not peak at the natural resonant frequency of the platform, and that was successful.

In Bullwinkle, that same technology was applied in the initial design phase to find a way of avoiding wave resonance at the platform's natural frequency. That was successful.

Having learned that complicated is not always the best way, Bullwinkle went brute force for installation. It was built in one piece and the contractor built a new launch barge 850 feet long to carry the platform. When you launch a 1,350 foot platform off of an 850 foot barge, even though the barge is the size of an aircraft carrier, the platform still dwarfs it. Instead of the jacket just sliding to the end of the barge and then tipping off, which is how the smaller ones used to go, this one was so large compared to the barge that it pushed the barge 80 feet under water during the launch. And then, the barge kind of squirted out from under it. I like to compare it to watching an alligator slide off a log, if you have ever seen that in a Tarzan movie or at one of the jungle gardens; you have to consider the whole system -- the different parts interact dynamically.

JP: What financial arrangements would convince Brown & Root or McDermott to build such a barge?

PM: Brown & Root would not bite the bullet. They did not get the job and they went out of the offshore business in the Gulf of Mexico. The successful contractor was a joint venture of Peter Keywitsons, Kayser Steel, and Heerema. They subcontracted the jacket prefabrication to Kawasaki Steel in Japan who made the jacket like a giant Tinker toy; you just had to bring the pieces to south Texas and weld them together. This consortium called itself Bullwinkle Constructors. They were actually organized as a joint venture to do the job. They bit the bullet on building a fabrication yard big enough to do a 1,300 feet jacket in one piece. They bit the bullet on building the 850 feet launch barge and they actually had the chance to use the barge again on a couple of other major platforms because simple was obviously the way to go.

Side B

JP: You must be getting close to where you can see the limit of doing it that way.

PM: Well, Cognac was 250 million. I think that Bullwinkle was about 400 million - ten years later, after a lot of inflation, so in current dollars, it was actually cheaper. The TLPs tend to be billion dollar projects, but that includes pipelines and the wells which are more expensive because you have to drill them with subsea technology instead of conventional drilling technology.

JP: In terms of the head office design group, when you are moving out to that depth and you have these other technologies, how do you finally bite the bullet and say, this is best done with one fixed platform? And then, how do you then say and nothing else after that?

PM: Well, in the case of Bullwinkle, it was a case of we knew how to do the fixed platforms and we did not think the other technology was quite yet ready.

JP: A case of we know somebody who will give us the barge?

PM: Well, that was negotiated during the project. We did a

JP: Do you think they made their money back?

PM: Oh, yes. The project was well executed. It came in on budget and on time. Gordon Sterling had a lot to do with that. He organized a very harmonious working relationship between Shell and the contractors and also, between the contractors. He selected a Shell representative in Japan, for example, who could change his personality from happy Buddha to Samurai if the occasion called for it!

JP: It probably did call for it!

PM: Yes.

JP: Did they ship it from Japan or did they build it in the U.S.?

PM: They prefabricated the braces, so they shipped it in pieces from Japan and then assembled it in Corpus Christi . . . well, near Corpus Christi - in Engleside, Texas.

End of Side A

preliminary design. I led that effort and shopped around for contractors. I did it with a fairly small team up to that point. Then, once it was contracted and a go project, it just got bigger and bigger and I actually went off and did something else. I worked on compliant towers which are like fixed platforms but tall and skinny, so instead of reacting rigidly to the waves they sway with the wave force. We came up with designs that would have worked.

One was actually in a fairly advanced stage of being designed for a field near Bullwinkle called Popeye. It was essentially going to look like a tall, skinny Bullwinkle but it would be built in two pieces instead of one. It was going to be in 2,000 feet of water. We had the technology all worked out and ready to go with a design in an advanced stage of preparation. They drilled one more confirmation well in between the other two exploratory wells and it was a dry hole. so, these dreams of a big field suddenly collapsed. It was eventually developed subsea and tied back to something nearby with three wells, I think. So, the 40 well dumb structure was, well, dumb in these sense it just sits there and does not require high tech components, but clever in the way it is designed. It just went by the bay.

JP: Is this the place that comes up with the concept of using Bullwinkle to develop a whole section of the Gulf? I was on Bullwinkle when they were redoing it to become more of a processing platform than its own production platform.

PM: That decision is taken in the operating division - how you organize projects. Even for Mars, I was pushing compliant towers because they would have served better as a regional hub than a TLP that was designed just for the wells in that field. Those were dark days for oil industry economics. Nobody wanted to bite the bullet on a huge structure; now, better than half a billion dollars, that would not be moveable in case the reservoir was a dud.

JP: Had compliant towers been used around the world?

PM: Hess built one in the Gulf of Mexico. Texaco built one. There are some being designed for West Africa as we speak. It is a choice between wanting something with conventional oil field technology, so if the well acts up you can take a wrench and beat on it or get a guide and reenter it, versus if it is subsea you have to be a little more sophisticated about how you do things. TLPs still let you do a lot of those things, but if you have total subsea development you had better be sure you have it right in the first place because to go back and reenter is a hugely expensive proposition, to the point that sometimes fields are abandoned because of some little mechanical problem in a subsea well.

JP: That is a cost risk problem and how certain are you that you will not have to go back and try to .

PM: Yes. The Mars compliant tower that I designed for 3,000 feet of water was going to be the mother of all resilient structures. It was designed to serve not only the needs of Mars, but as a regional hub. Because it would have cost more than to just go after what was a Mars, that would have adversely impacted the economics of Mars as a project and they did not buy it. What it takes, I think, is to consider the hub function as a venture in its own right and not burden the field with that expense. But they were not ready for that at that time.

JP: They were seeing how hubs work a little more, I think.

PM: Yes.

JP: It might be a different calculation. I thank you for your time. We might come back later and ask if you would talk about some of the Shell stuff more specifically.

THE END