ORAL HISTORY PROJECT

Interviewee: Pat Dunn

Date: July 1, 1996

Place. Columbus, TX

Interviewers: Dr. Joseph Pratt

Bruce Bobuff

JP: This is an interview with Pat Dunn in his home in Columbus, Texas, July 1, 1996. The interviewees are Dr. Joseph Pratt and Bruce Bobuff. Mr. Dunn, we will start again to ask you how you came to work for Shell and what your responsibilities were in the company.

JP: I graduated from Ohio State with a master's degree in civil Engineering in late 1960, and went to work for Shell in January of 1961. The reason I went to Shell was that Shell was looking at the time for civil engineers to work in their recently acquired offshore area, to design and build structures. I was fascinated by what seemed to be an opportunity, so I went to work for Shell. The first year with Shell, I spent on a training program. In early 1962, I was assigned to a division that was involved in, even at that time, relatively shallow water, 60 feet approximately, putting in structures and drilling wells from those structures in that water depth. I was there for about three years working on structures and facilities. Then was involved in a major study that Shell conducted concerning economic of the offshore. What we did is we looked at the possibility of developing gas and oil fields in out to 1,000 feet of water, how

much money we thought it would cost and so forth. The reason to do this study was because at that time, the federal government was contemplating leasing deep water areas at that time. Shell wanted to be prepared to go after the leases if it was economical to do so.

At that time, in 1964, I think that the deepest water we were producing in was about, right about 200 feet, maybe 300. So, it was quite a leap forward to try to figure out how we would produce oil and gas in 1,000 feet of water, much less drill there.

In a few years, in 1969, I returned from a year's assignment in Midland, Texas and I took over Shell's offshore design group which, at that time, had about 20 engineers, naval architects. Our job was to design and oversee fabrication and installation of all of Shell's offshore structures. At that time, we were designing structures for over 300 feet of water. In 1974, we started designing a structure of 1,000 feet of water which was subsequently installed in 1978, and proceeded to design, I think, probably about 100 structures of all sizes and shapes. We began the design of the 1,350 foot structure, "Bullwinkle," in 1984, and it was installed in 1988.

We had started on the tension leg platforms on a small scale in the mid-1970s, about 1976. We got more serious about TLPs only about 8-10 years later when we acquired some deep water leases where we knew we could not install fixed platforms. I was still in charge of the group that was involved with the studies of TLPs, and other types of deep water structures, too. That continued until my retirement in 1993 when we installed the first deep water tension leg platform which was in about 2,900 feet of water.

JP: When you came to Shell and began working this area, what were the key problems facing the industry in the early 1960s as far as the engineering standpoint for offshore?

PD: The lack of the computer. It's kind of strange to say but we were designed by hand and necessarily in two dimensions. It's amazing how it was done and it is also amazing that there weren't more failures. The introduction of the computer which started in, at least for the offshore business, about 1964, caused a revolutionary change in the design of structures.

Others problems. Welding was in its infancy, at least as far as the offshores was concerned. Welding and

materials. We had difficulty getting the right materials and getting good welding techniques. There was gradual improvement on both counts, specifically materials and wielding techniques, by Shell and by others, which culminated in guidelines that were written by the members of the API. And those came out in the late 1960s but most of the work was published in the 1970s.

Soil mechanics in some areas of the Gulf caused some serious problems, especially around the Mississippi River Delta where there were some structural failures and many, many pipeline failures. It was not until the early 1970s that we, the industry, had a pretty good handle on just where these areas were, what caused soil movements, and how to combat, how to put structures in these areas. Structures are now successfully installed in these dangerous areas.

Fabrication was not a major problem except as I mentioned. It seemed that the fabricators in existence at the time, primarily McDermott and Brown & Root, could build whatever we designer asked them to. This was true also installing the platform. They were able to figure out how to install them and later on, got the necessary equipment for us to proceed further and further into

deeper water.

JP: That's a real interesting question that we keep finding from the historian's perspective. The definition of deeper water changing through time. You said you're both an engineer and you had studied the economics of it. Can you give us your insights into how that changed? You said you were starting at a time where the common depth and talking about going to 1,000. How was that calculation changed through time? What had been the major determinant of what is defined as deep water?

PD: Ultimately, it had to have been the leasing of the deeper waters by the feds, and by the feds asking the companies what they thought they could do then. And Shell and Exxon were probably the people who said, somewhat arrogantly probably, we can do anything we have to do to make money. So, it was decided to lease this deeper water and it would be just a matter of… well, there were two big breakthroughs that caused Shell and others to say that they could do it. The first problem was drilling in deeper water. So, that caused the creation, the invention of the semi-submersible. A guy name Bruce Collipp with Shell was

the principal to drill out to 600 feet of water. This occurred in the early 1960s.

JP: Could you spell his last name?

PD: I should and parenthetically that previously, it was assumed by everybody that we would be producing in 600 feet of water subsea because it would be too expensive and that's another important consideration. We're finally there. That's a little unfair… Shell, when I came to work in 1961, was spending a lot of money on subsea completions of both offshore California and the Gulf of Mexico. It was very top secret stuff… remember, in Week's Island, they were doing some tests with the subsea wellhead and they had it covered and they didn't let anybody know about it because they were sure that the only way to produce economically in, at that time, I think even 300-400 feet of water subsea… we poured one heck of a lot of money into subsea and there were fits and starts for 35 years. As guys like me figured, what the hell, you guys are never going to make any money with that foolishness… because they tried to do, they tried to handle every problem and they were, for want of a better term, most of these mechanical engineers were

"tinkerer." They liked machinery, stuff that goes clank in the night, and they put everything they could on these damned subsea wells and they made sure that they wouldn't by doing it. And some poor souls, finally, I guess, decided to make it simple. So, that helped a whole heck of a lot. That's an over statement. I think you'd appreciate that. But we always felt that as long as those same guys were around, Shell could never make money because they'd never work. They had too many things that could go wrong. But that industry has finally improved, well, reliability is the key. A lot of machinery now made by outfits who are good at it… stuff is reliable so they work. So, that's the reason you have Popeye, these things. And a lot of it was done in Europe, primarily because they probably had the same type mechanical engineers. But the cost of platforms was far, far more over there. The wells were far more productive because the alternatives were so expensive, specifically platforms. And the wells produced fairly simply. By that, I mean we had the problems of paraffin, carbon dioxide, H_2S, God knows that all. They didn't have those. So, the problems were, in order of magnitude, simpler. So, as far as water depth was concerned, it didn't make any difference because the subsea was on the

bottom. So, Europeans did a lot of work. When I say "Europeans," I'm talking about the companies who were operating in the North sea. Most of them were American. So, there was a combination of Americans and Europeans who were doing good technical work. So with the integration of what was going on in the North Sea, with the economics of deep water, the industry felt that subsea would finally make its mark in about 1,000 feet of advantages, of course, of "Koniak,"… we could put 62 wells on that platform and we did. So, that's a tremendous incentive. It would be tough to spread 60 wells on the sea floor. We could do it but it would be very expensive.

So, at that time, the technology of fixed platforms was moving a little faster than subsea. So subsea took a back sea, again, in the Gulf of Mexico. It was developing, as I said, in the North Sea still, because the economic picture was different there.

JP: The subsea would have required the big companies to rely more on contractors, would it not?

PD: Yes, that's correct. And the contractors, of course,

didn't want to build up until they saw assurance that they could make money. And that caused problems. It's the chicken-egg situation. So, that didn't help in the Untied States because the contractors aren't going to stick their neck out too far unless they were assured that the Exxons and Shells and the Chevrons were going to use their equipment. Simultaneously, the fixed platform bunch was merrily going on and on and on. And understandably, the president of the company, here, he has a sure thing with the fixed platform. And here he has this subsea which was not yet approved, the reliability wasn't there yet and he knew it, even though they said it would be a lot cheaper. Well, it may be a lot cheaper but if you can't produce it, it's worthless. So, they would actually stick with the tried and true platform.

JP: It strikes me that Brown & Root would have been in a strange position in that they were leaders in platform but also in pipeline and driving with the Taylor Diving.

PD: That's right, but let's look at the economics, With the fixed platform they made their money doing that. But both McDermott, Brown & Root and the contractors, they didn't play much a part in

this because that wasn't their business to downgrade offshore, so they didn't do it. They knew it was going to come. They thought it would come earlier that it did. So did most people in the oil companies. Obviously, you look at one of those big things, that's a lot of money. And then the subsea genius comes up with this little petroleum engineering not very knowledgeable about anything with economics. They said, geez, how the hell are we putting these huge platforms on it.

JP: Could you summarize briefly for us or not briefly, Shell's position in all this through time in your years with Shell and even before, if you got a sense when you came to Shell, Shell's image of itself, where Shell was most innovative?

PD: I think Shell has been and is now the leader in offshore construction and it development. Well, scratch construction. In offshore development. I have charts of this thing showing the deepest water structures put in over 35 years, well over half of them are Shell's. shell also was the leader in developing deep water drilling as I had mentioned. Bruce Collipp was instrumental in that, and that opened up the deep water. And I think that

Shell management was considerably more optimistic about what could be done in deep water andevidently, they were also considerably more optimistic about what they'd find in deep water. Part of this was due to the fact that Shell and I think Mobil, and a seismic technology called Bright Spots… you've probably heard that term… and they used it quite effectively offshore. One of the reasons why we were scouting deep, deep water is because John Bookout, the former President who was a geologist, he felt that we didn't know exactly how to produce in deep water in 2,000, 3,000, 4,000 feet of water, but he also knew that a lot of people were afraid to get In there. So, Shell just went ahead and bought those leases very cheaply. We had three-fourths of the leases in deep water at one time a couple of years ago. And he just took a chance. Probably one of the most brilliant moves that anyone in Shell has ever made. We told, at the time, this was in the 1980s, I told you before that were had been working on TLPs for five years. We just said that we could figure it out, how to do it. We could figure it out so let's go get these leases on the cheap. It's not that he believed in us implicitly. I was a combination of economics. There was potential. In the United States, there isn't much potential for big, big fields. There was potential in offshore, not because

people knew about it. That was the only area that was unexplored. And so, he just took a chance, got the leasing on the cheap. BP was also involved. They were moving ahead.

JP: Don't you have to produce something within 5-6 years only…

PD: Five to ten years. That's correct. But you could get waivers. That was another big factor. I don't know this but John Bookout evidently figured, well, the feds aren't stupid. We could get a five year lease but you know darned well that if you explained to them, " we can't do this in five years." It will take three years to build the structure. Common sense says they'll give in. And they did. So, there was no problem. But that was a big "problem" to a lot of folks. The feds would make you do something that you shouldn't do. And, of course, that was a plus for that shore time, was a plus for subsea, too. Shell, at that time, had gotten a little sour on subsea because they didn't figure you could make enough money with these wells and you couldn't get to was a problem. If a pipeline goes south in deep water, it probably is cheaper to lay

another one. Repairing those things is going to be a chore. Even now, it's going to be a chore. So, that was a factor.

JP: Be sure, us and the transcriber, the seismic technology that you had, the name of it again?

PD: Bright Spots. And the reasons it was called that is because on these… you've probably seen these squiggles.

JP: No, I haven't.

PD: O.K., somehow or other, the oil was slightly differentiated from water in bright spots. Now, the technology exists throughout the world now. At that time, it was proprietary to Shell and I think Mobil. I'm not sure about Mobil. So, it gave them a leg up maybe for about a year or two years because I am sure, as you know, you don't keep secrets. That helped as the 3D seismic over the past few years, they could go out now in deeper water with a lot more confidence and know better what might be down there based upon the more sophisticated seismic techniques but believe me, it's not as you would think. And say I

don't know that. But I was going to say probably you will never be a sure thing until you drill. It's possible. Some people think it's possible to be able to tell with a fair amount of assurance. I don't know. But at any rate, the 3D seismic has helped a lot in deeper water as it defined the reservoir better and you can get volumes easier. Once you drill a well, for example, the seismic the biggest mistake you could make, and we've made them, too, is to go out… I told you about the Boxer platform. Our exploration people drilled only three wells. I'm not positive about the number. But since exploration wells are quite expensive, they said, let's go, after just three wells. So we put Boxer in 700 feet of water. We did find a reserve. That's happened to Shell, two, three, four time, to my knowledge, and it's happened to everybody. But, for example, in "Koniak," we drill 11 exploratories. I think the same guy who drilled the 11 exploratories is the same guy that previously drill the three. I don't know that.

JP: Other than mine… keep your job…

PD: Exactly. And that is not the keeping job so much. But, one's past experience certainly colors what you do in

the… there's no question about it. I have don't it, too. For example, I've mentioned bad mouthing subsea. Well, I grew up that way because they always… these guys were the hot shots. They were always given a fairly big budget. Nothing ever happened. So, I was colored by that. We'll be drilling from platforms until the year 2050. That's an exaggeration, of course. But managers, their decisions are certainly influenced by their own experience and the experience influenced by their own experience and the experience of others. And part of it has to be I want to keep my job.

JP: Partly that at Shell then, offshore Gulf of Mexico, has been good to Shell in the past and might have explained why Shell stays so optimistic about it.

PD: That's right. It's been very good.

JP: Are there companies that it hasn't been good for that we should look for?

PD: Yes, small companies. For example, there is one now, Tatum Offshore. I mention to you this flow line problem. They were very ambitious and they had some discoveries in deep water and they put this subsea facility in and started up, and they forgot about paraffin and their

line plugged with paraffin. They had to abandon it. They are still active but I don't know how active they are going to be. Several companies lots platforms. During hurricanes, they didn't stop anybody paradoxically. They understood the reason because the designed or not taken care of. Once managers got a good feeling for that having happened, and once their people told them they could handle that, that didn't cause many problems, other than as Chevron did, to a less extent, Exxon, and to some extent, us. We build extra strength in platforms. Chevron did. As a matter of fact, Chevron's decks were up at almost +85 something. Ours were +55, +60. Chevron, one of their first engineers, he's still alive…

[PAUSE]

JP: Paul Besse?

PD: That's it. I don't know where he is but we can find out from chevron. He was one of these guys that figured well… the additional cost of being safe was cheap so let's do it. Exxon took that tact, to some extent to a guy named Arthur Lee Guy whose name I am sure you have. His statement was that error is cheap. And in a very real

sense, he was right. And Shell kind of had that philosophy, too, not to the extent that Paul Besse didn.

JP: It seems to be a philosophy that the big companies could have a lot more easily than the small companies… it seemed like a lot of the offshore we had was, in a sense, rigged for the big companies to win.

PD: You're right. The reasons, of course, was that the big companies had a lot more to lose. If Chiquita Banana Oil Companies lost a platform, they wouldn't make headlines. If Shells or Exxon or Chevron lost a platform, they'd make headlines. And they did. And besides, we were going after bigger stuff. So, you're right. The deck was stacked in favor of the bigger companies. I mentioned one. Shell and Exxon told the MMS, the feds, yes, we can do it in deep water, because we had been working on or deep rigs. The other companies didn't that argumentative capability.

JP: This ties into earlier before the tape recorder was on, you were talking about the platform height problem and the wave problem and it was very interesting and it does

tie into this margin of safety. Could you go back through that for us on the tape?

PD: Yes, in the mid-1960s, A.H. Glen was the guru for hydrodynamics and wave heights, designing wave heights. He had recommended that the industry use a design wave height of 58 feet in water depths deeper than about 150 feet. Most of the companies abided by this design wave height. Some of the companies research and development groups had been working to try to upgrade this wave height. Shell and Exxon in particular that I knew off. And they were tending to move the wave height deeper. Understandably, there was a reluctance on the part of management to do that because it would cost more money. So, not much was done until 1969 when Hurricane Camille came along the Shell measured awave height of right around about 75 feet. Understandably again, that go people's attention very quickly.

BB: People had been looking at 50 something feet before that.

PD: 58 feet. Except the R&D groups… well, Chevron, too. Chevron had been doing some work and they were about to go to bigger wave heights. As a matter of fact, I think they already were there. But the majority of the

industry was still using the 58 foot. Shell very quickly changed theirs to right around 70-71 feet. 72 feet, I think it was, in 1970 or 19071. The industry, through the API, was working…

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Side B

JP: Wave height problems of the late

JP: problems of the late 1960s and early 1 970s.

PD: The industry, through the .PI, was working on the problem in 1970, 1971, and 1972, attempting to arrive at a consensus for a recommended design wave height. There was a good deal of difficulty in getting a consensus of a higher wave height because a lot of executives in the various companies were quite concerned that if we raised the design wave height, then the government might force us to go back to our older structures and raise decks in order to accommodate this higher design wave height. That notwithstanding, agreement or consensus was finally reached in, I think, 1973. I'm not positive about the date but that can be checked.

JP: Are there similar design problems that stand out in your memory of your career working on the structures?

PD: Tubular joint design was one other one that was a problem. Far less a problem now because of the advances that have been made over the past 25 years in materials, in welding, and empirical tests that have been done on tubular joints. But it was a serious problem until the

1970s, The industry just did not know enough about thing could be learned from the on—shore industry because very few people used tubular joints. For example, you don't see buildings made out of tubes, very few anyway. But primarily through work of the R&D groups of various companies, a lot of progress was made in the late 1960s and 1970s, and new design guidelines were written into the API .recommended practices. There was not too much opposition to doing this because all members of the industry, I think, saw that something had to be done to improve. And besides, very few people knew about the intricacies of tubular joints, so what they didn't know didn't hurt them, I'm talking about the added cost. They didn't know, they didn't tell so...

I had mentioned. Do you want me to go through that again? Soft soils?

JP: Yes, that would help.

PD: Well, there is one thing. Taking soil borings in deeper water, I never thought was a major problem. [___] always figured out how to do it. They were developing new tools, so we never had to wait for that, just as [___] You pat my back and I'll pat

yours. We, the designers, knew what the fabricators could do, so we tended to design for their capability So, even though we had to step out sometimes, we certainly talked to the fabricators beforehand to figure out what they thought they could build, So, it was a cooperative effort. We really never had to wait much for the fabricators, nor the soil borings people, except in this soft mud area around the Mississippi Delta, That Stumped everybody for a few years, how to combat it. I remember that [___] companies including Shell had many, many flow lines broken whenever there was a hurricane We were learning very quickly about why soils moved, when they would move, primarily associated with hurricanes, and when they would not move and what to do about it, how to design the structures. Not much more work done today, to my knowledge, because I think that problem has largely been solved.

JP: Was the Mississippi Delta the worst of the problem anyway? Has anything like that been encountered around the world as bad?

JP: Yes, there will be. We looked at that. The Niger River, I think, is going to be a problem. It may be a problem if that delta extends out into deeper

water. And, as you probably know, a lot of companies are very interested in the deep water offshore Africs.

BB: [___] the soils coming out of the Sabine?

PD: No. I think the Sabine is very, very small relative to the Mississippi, The same is true of Achafulaya. At one time, the Mississippi was the Achafulaya, so that's the reason most of the stuff has been deposited off the Mississippi. [___] Amazon, There have been had experiences there, too, in the Amazon Delta. Not major because nothing, to my knowledge, has been found there, but I know that there were some drilling rigs drilling in the Amazon Delta had bad things happened, They tended to move. I don't think anybody was hurt.

JP: Did you spend most of your career in the Gulf of Mexico?

PD: Yes, Of the 32 something years, 31 years were in the Gulf of Mexico. We did do some design work for Shell UK in the North Sea, so we did design a couple of platforms as consultants And we have worked for Shell Oil Company's foreign subsidiary called P1ectin,

different from that of Shell, And we designed platforms for offshore Brazil, and we just finished designing a couple for offshore China. That's not a major part of our business. By far, the Gulf of Mexico, We designed platforms for offshore California. We have four or five out there and one in the [___]. The disadvantage in California was purely political, It is very hard to operate out there offshore because they put so many restrictions as you probably read about, that Shell has basically written it off, And we still have leases out there. I think we still have them. They have quite a bit of potential. But it is very, very difficult out there. Chevron has found that out. Are they making money? I don't know. It's quite difficult.

Is it worth it, even if they are making money?

PD: Yes, it could be. I think that the manager would say to hell with that. I'll bet you that Shell has done that. Let it go.

Offshore Alaska, we were very, very optimistic about the Gulf of Alaska, We had platform designs all ready to go. We never found anything.

[___] the Breakfast Sea. We were very optimistic about that. We built some gravel islands up there for exploration. The islands were a success but we never did find anything.

Now, offshore in the Atlantic Coast, we're very optimistic there, We found a lot of gas evidently but it was not sufficiently economic to produce. You know, in 6,000 feet [___] designs that are sixty years old, they would not be used. Shell Canada knew absolutely that there was a lot of gas out there, gas and oil. So, we've designed platforms for all of those areas but 90% of them are Gulf of Mexico.

JP: When you sit here in 1996, what do you see in the Gulf's future?

PD: More TLPs. How many more? I have no idea, Nobody does.

BB: Can I ask you a question about the TLPs? They're better for deep water because they're moveable, cost less?

PD: No, they're not moveable. They cost less. Portability is something that a lot of people talk about. But let me tell you, if you have a lease that you're developing in 3,000 feet of water, you'd better leave that damned TLP

there for quite a while. I mean, a lot of companies used to sell portability. The hell with that. You want that thing to stay there for 50 years and produce oil, and that's the basis for putting it out there. The moveability is, in my opinion, a very, very minor plus. Do I want to develop another lease in 3,000 feet of water in the year 2020 with a 40 year old structure? No. So, I think that that's a lot of baloney. There are a lot of people who disagree with me but they're wrong.

JP: What kind of depth would you think a TLP can extend to?

PD: For sure, 10,000 feet. I think that you can carry it further than that. I don't know of any reason not to. I don't know of anybody who has done detail work to show that it is not able to do it. It's possible, however, that there may be another type structure that will be less expensive, specifically, what is called a spar, is one candidate. The spar is just a huge can that is held up by buoyancy, just as the TLP, and it's basically… there are several around. One is being put in now. [make a sketch] That's a spar. Now, you could hold this in place either with what are called catenary mooring — those are anchors like that. Or you can anchor them just

like a tension lay platform, Some people will have both, What's the best? I don't know. And I don't think anybody knows yet, People who are working on the spar are a consortium of McDermott and Oker. They are designing one for Horrace now. So, they are going to be put in. The prototypical spar was the Brent Spar, Now, you may have read about that one.

JP: No,

PD: Shell UK installed the spar in the North Sea in right about 1974, 1975. Its purpose was to store oil. That's one of the big advantages of this thing. It sits there, There were no pipelines out to the Brent Field at the time, And it was just a great big storage tank with a deck here, And it was catenary moored. And. it worked like a charm. They had some problems with it but nothing to do with its viability. It stayed out there for 20 years, So, in my opinion, the spar is a good candidate, instead of the TLP, I do not know which is going to be less expensive Nobody else does either. And they won't find out until after they build the spar.

JP: Would you still have basically the same…

PD: Yes, as I was mentioning…

JP: And so, that price would be the same?

PD: Yes, either that or you might do away with that and use a catenary moor, a catenary moored like that. The regular old anchor business. But one of the problems with the catenary mooring, you think, in 3,000 feet of water, how long that thing . . . the line will have to be 30,000 feet long. It will take a lot of territory. But that's the disadvantage of catenary mooring. And the other disadvantage of catenary mooring is that if you want to put a drilling rig on the spar, use it for drilling and storage, which you can do, this type vertical support, will minimize lateral movement. If you have a catenary, that darned thing will move 600, 700, 800 feet, so you'd have more problems there. Well, I suspect, in 2,000 feet of water. I think you won't see catenary mooring, you'll see vertical. But you could do either one and maybe both.

JP: You're not optimistic about the subsea completion becoming economically viable compared to these things?

PD: Yes, I am, for specific fields. For example, these

numbersare not exactly right but I mentioned that costs $i2 billion to get there are 22OO,oo, 230,000,000 barrels of reserve there. Suppose you find a field out here with 75,000,000 barrels? Can you put. in a TL•P? No. At $20 a barrel, no way, And my guess is the companies are still using about $15—$17 a barrel to just try to play it safe. So, what do you do about that 75,000,000 barrel field? You don't want to walk away from it. There's only one option. Subsea. Nobody has yet found a surface piercing structure that will be cheap enough to develop the 75,000,000 barrel field. So, you put in [___] subsea or a combination of, say, a spar. Drill the wells, put subsea trees on them, and put this thing up there for storage maybe or for processing. Just a much, much cheaper spar. And then you could also have workover capabilities, So, you don't have a big structure like MARS, you just have one that will carry a workover rig and some limited production facilities. And you may even limit it to just separating oil and gas, forgetting about the water, pump the water, That's another option. So, my guess is that for anything 25,000,000 barrels, there's no question, subsea, For 50,000,000 barrels, probably subsea, For 75,000,000 barrels, maybe a combination of subsea and a minimum surface structure.

Above l00,000,000 barrels, if the wells are very, very prolific and you only need 5 or 6 wells, you may go subsea. But if you need 20—30 wells, you can understand you'd go to the surface structure because you can drill the wells from the platform. But subsea will have a big opportunity in somewhere between say 30,000,000 barrels and 100,01 maybe even more than that if you've got, as dry gas. It's all gas. So, that's the easiest to produce. You simply turn a valve and let her go. Very few things go wrong with a gas well. Unfortunately, sometimes these dry gas fields go wet after X years. Then you've got the problem of C2,0 etc., and then you'd better watch yourself, or you may just abandon the field prematured, which, if you make your money, that's not so bad, except that most oil company people who are geologists, they can't stand walking away from crude oil. It's born in them.

JP: In a way, you're talking about this Rllwinkle development where they are in a gather as a variant of this subsea with Bullwinkle already . .

PD: Yes, that's the other big point, the economic point. You don't have to take this subsea development and run it 150 miles to shore. You can take the Bullwinkle, or take it

to a TLP, because We can put like Augur. It's already designed for more flow lines that is definitely what you do. And then that makes, if you are 30 miles south towards Mexico, it makes it worthwhile and hot all subsea.

JP: And once you've got something like that, you want to get more interested in exploring around.

PD: Exactly. Because you know the economics have changed, and you can afford to pay more to get more for your lease. Exactly. We make models of just that.

JP: Are you assuming we're in kind of a steady state with world the federal government in the Gulf of Mexico that the rest of the country is going to start shutting down and we're going to stay wide open?

PD: Yes, I think that's the case. Because nobody makes any noise in the Gulf of Mexico. Now, what if a hurricane comes along in September? I think it will still not be a big deal because, just as explosions in Texas City. You know, it happens every week. Who the hell cares? I think that will be the philosophy. We don't have people like Californians raising all sorts of hell. We never

have, I don't know why, Neither Texas nor Louisiana. Now, they're in Florida, but we can't develop offshore Florida,Oh, well. That's an exaggeration, We can, with many, many restrictions, As you probably remember, Shell tried to drill a well in the middle of the Everglades, I've never heard of such an uproar.

JP: And not worth the trouble!

PD: That's it, The hell with it, Offshore California, as I've said, Shell has written it off, Permanently? Maybe, I don't know, Is there anything out there? Yes, I know there is, But it's not worth it, I don't think. At least, not in Shell's view and evidently, most people's view, But I don't think any major upset will occur politically for the Gulf of Mexico, Not even a big accident.

JP: It's almost too late to process it.

PD: I think.

JP: May I ask, as we wind this down, do you have any ideas For us about sources we should go to or about people we should go to? I'll show you the list of some of the

people that we've got. Particularly for the Gulf of Mexico?

PD: Bob Vissor. Lowell Johnson. He's not with Shell, He has his own company. He's in Tulsa.

JP: He's out of Shell?

PD: He's been gone from Shell for a long time. [___] Paul Besse would be a good one for us, Garland is too young. Bob Howard, no. From the standpoint o … Bob Howard was the President of Shell Offshore, He just retire.

JP: We will end up coming back to the modern periods,

PD: Well, what I was thinking, Bob would be able to give you the manager's perspective That would be good, He's been involved with the offshore for many years as a manager, He's not detail knowledgeable about structures but he's knowledgeable about what managers are supposed to do. [___] would be good. Either Bram or John Focht. Now, John will be easier to get to, I think. He's a little bit younger. But I'd try to get both of

them. You'll get some duplication.

JP: That's all right. You expect that.

PD: Gene can turn in Bowmen or Mitchel . There's probably a story in the advancement of the R&D groups that I think you ought to cover. In other words, Shell, Exxon and Chevron had major R&D outfits, Now, who would be the best one?

JP: Who would the Shell people be?

PD: The guy who is still t.here whose name is Dr. E.G. Ward, Skip Ward. He's knowledgeable will go back into the l960s. [___] head of McDermott, he's been around. He'd be interested in talking. Bob Brown, R.J. Brown. He was on pipeline. [___] just check the guys that I would think might… Howard, from a management perspective. Labordes for drilling. Try to get those guys. Lymon Reece would be good. From the soil's R&D, he and Hudson Matlock. His name, I am sure, is here, too. Hudson, I always thought, did more work than Lymon on that but Lymon is easier to talk. A of lot fun. Ben Gurwick, if you… concrete in the Gulf of Mexico is nothing. And that

would be a waste of time, I think. He'd sell you that we've been wrong in not putting more concrete in the Gulf of Mexico, but he's wrong.

JP: Yes, Jay had put him down as the North Sea. That's Jay's notation.

PD: Hersh… [___] This guy is fairly recent. He's a pretty sharp guy.

JP: What would be the universe of people we should be sure to put down at Shell?

PD: Lord,. R&D. I would strongly . . . I'm trying to think of the Chevron guy who was the . . . he retired a few years ago.

JP: He was in R&D?

PD: Yes, he was out of La Hobern.

JP: [Inaudible)

PD: Exactly. Good point. That's another . . . Skip will also know people who were familiar with what Shell, Exxon

and Chevron did in the l95O. [___] think, was busier than most people in the i95O' in R&D.

JP: They're pretty busy in the Gulf, period, for a company that's in California.

PD: Oh, yes. They had [___]

JP: They didn't even have a refinery in the Gulf Coast then

PD: They did not, You're right.

JP: They didn't build it until the l960s,

PD: And so did that refinery over a Pascaola that was built in the l960s. You're right.

JP: And selling it.

PD: I think, for at least my career with Shell, Chevron New Orleans and Chevron California were like Texaco and Shell, Unbelievable The people in New Orleans used to use the term "they" whenever they referred to Chevron in California it was the damnest organization I have ever seen, And, to this day, it's somewhat like that, Not

nearly as bad but . . . it permeated their whole staff in New Orleans.

JP: Well, they muust have been a stepchild with Saudi Arabia moving around in this period.

PD: it could have been. They didn't want anything to do with Chevron California Evidently, Chevron California just ecided to let them alone. We've got bigger fish to fry. It could be.

JP: it's a strange tone to that company, anyway, i used to work in Berkeley and I did work for them in San Francisco, it's a strange tone. It's British, aristocratic I don't know whether it was the Saudi Arabian or what …

PD: You bring up a good point. See, Berkeley has done a lot of work for Chevron f would be better than anybody because they were the ones .

JP: I think they're on here.

PD: You need to talk with Ed.

JP: Somewhere, they listed me some Berkeley professors, These are naval architects.

PD: Bob Dean. He'd used to work for me, He's a very, very knowledeable guy, There's Bruce, yes. But I'm looking for an old guy at Berkeley. Bill Martjnovitch would know, because he did a lot of work with Berkeley for the oil industry, He used to be with Erland Wright, in San Francisco, I don't know whether he's retired. He would be the contact there, and he would steer you to the view of the oil industry from the academic. Lyrnon Reese, a guy from Berekeley. And Martinovitch may be just as well. That would be interesting. He would be a consultant, He would give you another view of…

JP: Outside of the company…

PD: Exactly. Especially insofar as he's from Berkeley, As you Probably know, most of us feel that the graduates of Berkeley have to pass Arrogance 102, 103 and 104 before they are permitted to graduate That's the way we look at Berkeley. We never were able to hire people from Berkeley either, They love California, We only had two or three, But, at any rate, early on our people

were Berkeley folks. They had the same feeling, that we have to help those troglodytes down in Houston and New Orleans, get straight with the Lord!

[___] to talk with Bill and he could steer you to some of the folks at Berkeley.

Much older than any association with [___], we never…

JP: Yes, that's what I heard. There are a couple of guys they've talked about and one guy at Texas people have identified

PD: Hudson, Matlock, and Lymon Reece at Texas, and Green for concrete. There's not much sense in concrete. Rice, the only fellow was the earthquake guy who is still there.

JP: They had, I guess, a mechanical engineer, i don't know what he does, named Graf at U of H who wrote the textbook on offshore …

PD: Yes, he did some work with Pete Marshall.

JP: I haven't interviewed him yet but he's an Emeritus now,

PD: Oh, is he?

JP: I've got his textbook from our publishing.

PD: He didn't do a heck of a lot of work for too many people, but Pete Marshall, I think, was truly a genius, If you ever [___] probably still is. Bob, on a lot of different subjects, Bob was an unusual guy. He couldn't keep his hands off trying to run everything. [___] basically a lot of the managers know he was a high flyer and we sent out to California, Here's a lesson for you. He tried to do the manager's job, The manager called me up and said, "Get that Son—of—a—bitch out of my hair!"

JP: You didn't hire him to do my job!

PD: That's right.

JP: What about written sources of any sort. If you had to go back and try to recover this history of some of the things you worked on, where would you start? Is the API not that good at keeping things?

PD: I don't think so,

JP: This industry didn't seem particularly accustomed to writing up their achievements for the rngineering News record or anything like that.

PD: No. Especially in the 1950s, They just got after it,

JP: Were there any reporters ... is there like the Times Pcayune or the Chronicle? Does anybody have a reporter that took a special interest in this?

PD: Not to my knowledge,

JP: We found this guy named Calvary at World Petroleum who has three or four excellent detailed articles, then disappeared

PD: I think the reason was the Philosophy of the oil companies at the time... don't talk with anybody because they'll screw you. And that still exists, as you Probably know, to some extent. But it was especially true in the early l?60s, So, I'll bet you won't find anybody in the Times Picayune or the Post or the Chronicle. And you would have think they would have

talked to us and they never did.[___] nowledgeable, I think, magazines, is put out by the Brits. [___] this one guy does excellent work, he has done excellent work on our developments. He writes well. Darn it. These names have gone south. [___] offshore industry may not be the proper name. I think it is, See, there' an Offshore magazine which is American. Not that one, They never did all that good a job. This outfit, they do you all get a journal with Short articles but nothing major.

JP: This is the great journal from 1954—1958 called Offshore Drilling and it just went bankrupt. It's from New Orleans. It was very detailed, I guess nobody wanted that much detail! And then people did not buy it of.

THE END

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