OFFSHORE ENERGY CENTER

ORAL HISTORY PROJECT

Interviewee: TIM PEASE

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Place: Galveston, Texas

Interviewer: Joseph Pratt

JP: This is an interview with Tim Pease in Galveston on August 21, 1997. Let's start, if you would, telling us a little bit about your background, where you have worked and a history of where you were trained, and the kind of issues you have worked on, and then we will go into more detail about the particular projects.

TP: Well, my initial experience with the offshore business would have been when I spent three years in the Navy on a destroyer in the engineering department. Even though that may seem a different field from the actual offshore industry as it developed, learning all the pipes and engines and what you have to make that ocean going vessel work and something about the motions and sea waves and things like this, came back to be useful information to have in the back of your mind when you are actually developing your own drill ships or other things related to the offshore industry.

After then, I spent five years at Brown & Root in the special projects group. A lot of the time was spent doing things related to the early days of going offshore in deeper water and the ones where we went in and built the platform on location.

I got involved in designing those types of structures for the Gulf of Paria and eventually, a fairly large, self-contained platform in the Gulf of Paria, I did a lot of dock and harbor design which, again, was affiliated with the offshore business. I did a lot of work in Lake Maracaibo getting Brown & Root's operation set up then at Lake Maracaibo. And that turned out to be interesting because later on with my next employer, I had the opportunity to go back to Lake Maracaibo and work on some of the equipment that the Offshore Co. drilling people were using in Lake Maracaibo.

After five years with Brown & Root, I went to work for a company called The Offshore Company in Baton Rouge, Louisiana. I will give you a brief history of that. You have to remember that I could get a lot of things mixed up over the years but the guy that was running the company at the time I joined it

was a fellow named T.S. stone man and he was pretty much a legend in both the onshore and offshore industry. He had worked for a company called Danzinger Drilling. I think they were probably an east Texas company and eventually got involved in Louisiana, and had been involved in the discoveries of the fairly big oil fields around Baton Rouge. And somewhere in the late 1940s, Southern Natural Gas bought up the controlling interest of Danzinger Drilling. I can't give you the exact years but it was either in the late 1940s or early l950s. The Delong Company took an interest in a new company being formed which became The Offshore Company. They owned like 5%. J. Ray McDermott bought 15% of the company and Southern Natural Gas owned the rest. This then was the new company that was called The Offshore Company, and was primarily owned by Southern Natural Gas.

I was unaware of the company until I was contacted as a possible employee back in 1962. Actually, it was in late 1961. And by that time, the company had already built. Several big jackup using jacks and all this but this was the first offshore platform that was capable of going in over 100 feet of water. It was still recent enough that it was a story that the old-timers talked about when I came to work there, about how they got their first contract with Humble Oil & Gas.

They took Rig 52 out to do this job and Humble insisted they be paid on a footage rate because they were skeptical that the offshore company would be able to drill very fast with this self-containing jackup rig. And so, the first day, they made something like $150,000 ! This was a lot of money in those days. So after about three days of such big revenues, Humble was back with the offshore company wanting to renegotiate their contract and put the rig on a daily rate basis, which then pretty well became the standard way that rigs were contracted offshore from then on.

Along about that same time, late 50's, the company was building two eventually three, what were called lattice leg jackups in Orange, Texas. And the shipyard, I believe, was called American Bridge, and I believe, again, that it was a subsidiary of U.S. Steel. I am not completely sure of that, but they built three lattice leg jackups designed to work in the Gulf of Mexico in 125 feet of water. This was

the Offshore Company's way of competing with the Letournaeu rigs that were also being built using lattice jackups. Now, you are familiar with the lattice legs and all this?

JP: Yes.

TP: The primary thing of interest to me about those early lattice leg rigs was that one of the rigs, Rig 54, experiencing Hurricane Audrey. The rig was subjected to some pretty severe winds and waves and four of the legs were actually slightly bent on location. And so later when I joined the company and had the opportunity, I spent a lot of time getting hindcast data from A.H. Glenn and Associates, so I could determine what the waves and winds were at that time of actual event. And then go back and use this data to calculate what kind of forces must have been imposed on rig 54 to bend the legs, then I was able to use this along with the early wind and wave data that we used at Brown & Root . These formulas were derived by a fellow named Bretsneiter. He had generated a lot of curves and we could use this to calculate loading on the jackup.

JP: I actually played football in the eye of Hurricane Audrey. We were in a little school. The eye came in, the parents let us out in the wind and we played.

TP: Good gosh! It turned out to be a very good teaching tool for us because then we could find out what, if you had waves of this height and winds of this velocity and this type of structure, well, chances are, this was about the wave forces you must experiencing. And then this data eventually became the criteria we used internally to design and build our 250 feet and 300 feet water depth capacity rigs in the North Sea.In this mid 60's it was also the criteria that Offshore Co. helped introduce to the American Bureau of Shipping when they were writing the first rules and regulations for design of offshore mobile structures. That was kind of an aside about what was going on in the early days before and just after I went to worn with The Offshore Co.

One other story about the jacking system was that when rig 52 was built, it went to the location utilizing the Delong air jacks which had been primarily designed for use in the construction industry and used pressurized air bags to grip the legs. These jacks were notorious for 4lng go at the wrong time. There were occasions when

the rig would be moved from one location to the next with the legs sticking up in the when one of the air jacks had let go its leg would fall to the bottom of the ocean! I think that happened about twice. So, the company went back and converted to hydraulic elevating jacks using pins in the slot on racks on the legs to grip six foot diameter tubular legs. The hydraulics jacking scheme became the scheme that we used on a number of other smaller jackups as well as the large jackups later on. It worked much as a bumper jack engaging a lower set of pins to hold the legs as the jacks expanded to permit inserting a set of upper pins.

Somewhere in the mix, the Delong interests were bought out. I would say around 1960. So, the offshore company retained all of the Delong patent rights to the basic Delong jacking concept when used for drilling. All of the other patents Delong had, with the exception, for some reason, of operations off the west coast of California. So, every time we wanted to use a jackup or sell a jackup design or do something off the west coast of California, we always had to go back to Delong to get a simple license to do that work. So, that is kind of the history of the Offshore Co. before and just after I got involved. A little bit of an aside on what happened because of the damage of Hurricane Audrey.

When I first went to the company, I was taking the place of another senior engineer that had either retired or I don't know what. He was gone. At that time, it was myself, one naval architect, and one other petroleum engineer type who had come through the ranks as a tool pusher and became a full—fledged engineer. And then, the chief engineer, and vice—president of engineering was my boss, so we were a very small group, we were mainly responsible for the design of new rigs and also for a group called the jacking department. This jacking group had a number of people that were sent out to the various rigs whenever they were moved. So, we of were the support group for the jacking

department, and if they had design problems, they would come in to see us and we would help them take care of their problems.

Also, since the company was so small, when we were in Baton Rouge, just guessing, I'd say we didn't have more than 30 people in the whole company in the Baton Rouge office, including accounting and whatever. There was a lot of interface between the operations people and everybody else in the company. So, if we could help one another do things, well, we always worked together.

An interesting side line about …just sitting here talking makes me think about it …is that this guy Stoneman was a real dictator. To get in the building, you had to come through the front door, past his office, and he always left the head office door open, and he had a big clock out over the switchboard, that way, he could keep an eye on the girl running the switchboard as well as this big clock and see who was coming in and out of the building and what time they got there. My habit was coming in late 9:00 in the morning or something like that and staying late at night well after Stoneman had already gone home. Well, every morning, I got the evil eye… I was this guy who was always coming into the building late. That was an indication of how he ran that company and the details that he looked at.

We had a Xerox machine which was, at that time, a big deal because you didn't have to use a fax machine to make copies or a thermofax, as it was called then. And so we had a Xerox machine but nobody in the company was permitted to use the Xerox except the guy that ran the radio room where the Xerox was located. So whenever I needed to get a Xerox copy made, when trying to work out a design where a different alternative might work better and needed to get copies of certain pages so I could play with the design, I would have to go down to this radio room and get this fellow, whose name was Shelton Parker, to take off time to come over and make my copies. Shelton didn't think too much of wise engineers so my requests would usually languish for a while.

The other thing that was pretty well legendary around there as far as control was how he had the grass cur in the front of the building. He would be outdoors frequently belaboring the janitor about, "This grass is kind of all over my walkway. This is how I want this cut." The janitor's name was Charlie, and Stoneman spent a lot of time making sure Charlie got that grass cut right. This was just the kind of guy Stoneman was.

He died after I had only been there maybe four or five months. He suddenly had an unexpected heart attack So, the company completely changed management and effectively, direction, and about 1-1/2 years later, they moved to Houston.

Getting back to when I first arrived on the scene, we didn't have any particular projects going at that time. And so, they handed me the structural drawings for a little barge that the company was considering putting legs on and making a jackup out of it. They were looking at operating in Peru. I was able to go back and use the experience I had at Brown & Root from designing a flow station which was a big tank that had to stand on four independent legs in Lake Maracaibo. In effect, you are making a big bridge span between legs, and you take a barge which is designed by a completely different set of

rules and the steel is a lot thinner and we don't have flanges where you want flanges and you don't have stiffeners where you would like stiffeners for use a bridge. So you have to go back and figure out how

you put all the steel in and make an existing barge hull strong enough to work, in effect, as a series of interconnecting bridges in 3D type bridges i.e. working in two different directions or three directions.

So I worked on that for a while. In the meantime, a couple of other little minor structural design things came along. All of a sudden, my boss, George Richardson, came in and said that the board had received approval to build a turret moored drillship. I went to work there in early 1962, and so this would have been probably around March or April, 1962.

It turned out that George and the engineer that I replaced, had patented a concept for a turret moored drillship and there had been a model tested at the University of Michigan. Our naval architect at that time Roger Johnson was handling that aspect. Then finally it was decided that the concept showed for drilling from a floating ship through the middle , the few other floating ships in existence were trying to drill with the drilling derrick located on the cantilever over the side of the ship. And that procedure, to date had been very unsuccessful.

As an aside, are you familiar with turret moore drilling ships and all of that? Do you want to look a t the brochure on that?

JP: Just for the interview probably ...I've got a brochure that you are talking about on SONAT's turret moored drillships. I will get a copy and put it with your interview. This is a pretty dramatic departure in design, is it not, for the mid—1960s?

TP: It really was. When we are talking about it now, it seems like it is obvious that if you can keep a ship headed into the seas and all this, you will have a lot less motion, both vertical motion as well as any kind of roll or pitch. But at the time, even though there had been these primitive model tests, that we had conducted , nobody was really sure that the concept was going to work. So, we called it the triple driller. The design was such that if it didn't work as a turret moored drillship, we would be able to have a cantilever where we could get the drilling rig off over the side and drill over the side. And if that didn't work, well then, as a drilling to a normal and point system and the ship configured tender, so it can work with a drilling rig located on a platform. Nobody was convinced torret mooring was going to be a big success.

Anyhow, George gave me this job and he said, "O.K., here is what we want to build. We've got Roger Johnson here. He'll take care of getting, the ships hull put together but once you design the drilling

structures and turret…. We are going to put these winches and everything together with the ship's hull and make this concept work.So, my first major assignment with The Offshore Company, was to design the turret itself, the roller mechanisms and rails and fairleaders that the mooring lines went through the drilling substructure that fit over the turret. All of this had to interface with the drilling equipment so that the rotary could be skidded out of the

way or whatever else had to be done. I learned what a rat hole , for example, was. It had to have a rat hole that would fit down inside of the turret and be able to lean forward, to be used as a rat hole, then pulled back out

of the way when the kelly had been put in. So, all of this was something that hadn't been done before and had to be developed more or less on the spot so that we could make the concept work.

At that time, because of the limited staff my own draftsman, taking all my engineering designs and what have you and draw them on pieces of 8 1/2 " x 11" . I ended up with a booklet of 25-30 sheets that covered all this. McDermott, since they owned part of the company, was the prime contractor to build the turret . I ended up going all over the country to get special things like the wheels and rails and fairleaders and what have you fabricated. So we had components coming In from all over to make this first turret.

McDermott also built the substructure and parts of the Substructure that interfaced with the turret itself. So that work was going along, Roger Johnson was getting his ship's hull built. This was being built at a shipyard called Southern Ship in Slidell, Louisiana, which was a little ship yard. Their machine shop still used a common belt drive to run all machines. It was a really antique place. So, the ship was getting built and McDermott was building the rest of the stuff. And then, other pieces were coming in.

In the meantime …now, this doesn't really relate to the offshore history ..well, it does in a way… Amoseas was a subsidiary of Texaco Socal, the company that had gotton a job to take this first jackup, rig 51 that had originally had the Delong air jacks to Nigeria, to work for a company called National soil or something like that. Gosh, I haven't thought about them in years, but they sent one man to set up and operate the coring equipment.

When we got there, we hired two seismograph boats, and I think they worked for a division of Tidewater. But for some reason, they were out of work at the time Nigeria. And we crewed up with local Nigerian. We essentially hired them off the street , We had also brought a bunch of Manila mooring lines and 45 pound anchors and what have you. We took off from Lugos. We also had to bring in a company that was doing the triangulation positioning for us. I can't think of their name but they were the ones that were positioning a lot of the platforms in the Gulf of Mexico. they had some kind of beacon system that was tied into radar stations onshore. The system was pretty extensive in the Gulf of Mexico, but there were barely enough stations in Nigeria to permit them going in and triangulating. And so, we would have to drop their guys of at the triangulation stations out in the jungle, for God's sake! And they then, through their radio connections with us on the boats, would tell us when we were over the location. We would man handle these anchors and get them out in a crude mooring pattern.

It turned out it was pretty rough water for what we were trying to do. And we bobbed around an awful lot. We would get out there and then, like in 100 feet of water, drop this aluminum coring equipment down into the sea bed. We would guess how far we had jetted the core catcher would take a sample. Pull it out. And then go down and get another one. So, we went through this very primitive way of getting our core samples for soil analysis.

In the meantime, all this stuff on the turret moored drillship was being built back in the States. By the time I got back to the States, we did find that the soils in Nigeria were just marginally good enough

for our rig to go to Nigeria. And jackup, so rig 52 was prepared to go to Nigeria, my first jobs, to figure out how rig 52 could be towed across the ocean by cutting off some of the tops of the legs still leave enough on place that when rig 52 got to the first location, they could jackup and then put the legs back. And the procedure Delong had developed for putting the top of the legs back… I mention this because this comes up later, is that he had an old converted, like drag line crane that you could move around on the deck of rig 52, you put out these timber mats to support this big crane. The drag line crane would then go to the individual 14 legs, and pick up a 35 feet leg top section and stab it on top of the leg. The final legs were 200 feet long. So, we ended up towing with 165 feet of leg in place. And then we put these other 35 feet pieces on top. And then, you could weld out the leg joint and it ended up that you didn't need to go to a shipyard or use a derrick barge or anything else, to come and support you as you reinstalled your legs up to their full 200 feet length which you needed in order to jack up in 100 feet waters in Nigeria. That was another reason gig 52 was successful, because it could go to Nigeria as an independent entity and get its legs put all together and be ready to go drill.

Rig 52 was prepared to go to Nigeria with 165 feet of leg sticking up as antennas as the tugs towed it across the ocean. By the time we were back working on putting Rig 52 ready to go, the parts for the turret moored drillship, which was by then named the "Discoverer" were pretty much coming together. My boss, George Richardson… I can't remember exactly, like in October of that year … had gone down to McDermott to look at the turret barrel itself and that part of the structure. And he was built the turret to large to just beside himself because he was convinced that I had fit in the hole that was being built in the ship. And so, immediately he went to Slidell and took measurements to double check and make sure that it was all going to fit together. But, fortunately he found out it would all fit together.

My next job was … because I had used these as the crew like to kid me about, these watchmaker fabrication tolerances for installing the rails and putting all this system together… Was to take my transit and level and tape measure to Slidell. I sat out there on a little temporary platform and in the

center of the hole in the ship shot in all the foundations for the rails to make sure it was all going to fit together. That was my first assignment after I got back from Nigeria.

That was a pretty exciting time when the turret and substructure all got put together. And, of course, the rig was being installed in the ship at the same time. There were a number of other firsts incorporated in that particular design which I didn't have any part in.

End of Side 1.

JP: The innovative designs in it and your role in it, continuing from side 1.

TP: O.K., well, that pretty much, I think, covered the turret mooring. We did have features ...we had an automatic heading control where we had thrusters proving transverse thrust bow and stern that allowed us to set the ship's direction at the heading we wanted to maintain. The thrusters would actually come on or off to keep us rotated into this most favorable heading.

The "Discoverer" was one of the largest drillships built up to that time and was 320 feet long x 70 feet wide x 25 feet deep. The drilling performance was actually pretty good, but what was learned was that 320 feet hull length was not adequate, say, in the winter months in the Gulf of Mexico. You still had motions that were not acceptable to the limits of the drilling equipment per se at that time –the bumper subs and the way you set the bop stack on the sea floor. And a lot of these things, those techniques hadn't been worked out to the extent that they could stand the motions that even the turret moored drillship had, say, in the winter months in the Gulf of Mexico. So, there were a lot of delays in the drilling operations in the winter in the Gulf of Mexico, and kind of pretty well deemed that it may not have been the proper tool for year—round operations in the Gulf of Mexico.

The discoverer's second contract moved the Rig to the Gulf of Suez in Egypt which again was an emerging area. So, that was the location where it went to work next. In the meantime, of course, the industry were learning how to improve all of the drilling operations so they could better work with the floating type of drilling vessel.

JP: How deep could this.

TP: That ship was designed to handle water depths up to 600 feet.

JP: Wow!

TP: That was a gigantic water-depth step up from the jackups. The jackups at the time, most of them were limited to water depths less than limit for the Letourneau rigs and at that time.Letourneau just starting to come out with what they advertised as 300 feet water depth jackups. Odoco came out with this V-shaped,semisubmersible, that was their first semisubmersiblethat was able to go out in deep water. And it was alsofairly successful from what I understand.

JP: So, this was an awfully creative period in the history of

TP: That's right. We were all just going from something under 150 ft. water depth to where the jackups were getting up to the 250 feet level realistically. And the the floating Rigs up to, say, 600 feet. Of course, there were a lot of other things that had to be designed to go with the 600ft depth capability such as your mooring systems had to be upgraded, your marine riser which is the conductor that connects between the ship's drill floor and the subsea bop stack. The marine riser had to be designed so it could withstand the various pressures and the handling and also maintain a certain amount of buoyancy and things like that. So, there was a lot of other design work going on with the various components needed to just support the various drilling systems necessary to be able to work in these water depths.

JP: What years would we be talking about when we are talking about this Discover and this V-shaped semi. Is that 1966?

TP: 1962.

JP: I keep being asked to define this question as changing definition of deep water. This has to be one of the eras where deep water gets redefined From 200 to 600 is a giant step.

TP: Yes, I would say we weren't even up to 200 very well. It was 150 mostly. I mean, our company was in 125 feet if we strained ourselves for those jackups we had. In effect, we jumped from 125 feet to 600 feet.

JP: If the design that you …always the innovative one is the first one? Did this turret moored driliship designprove to be kind of a permanent innovation as you improved it?

TP: Yes, and even the rigs that we built later on that were members of the Discoverer series, the next Discoverer we built was in 1967. We fought to overcome some of the problems we had with the first Discoverer. We made it 36 feet longer, so it was a 356 feet long vessel as opposed to 320 feet. It is funny how you remember these things and I can't remember the name of the current president at Rice. And in that extra 36 feet of length, we had, at that time, what was called roll stabilization tanks, which was water sloshing from one side of the rig to the other that was out of sequence with the normal roll of the ship. So that tended to dampen the roll. And so, you dedicate a big length of your ship to carry this extra water to do the dampening… The water went through various ports in swash bulkheads and that controlled how fast this water could flowfrom side to side. And it was designed by a company owned by McMullen who ended up being the owner of the Astros, McMullen & Associates. And they had, they called it, their flume system. So we added that.

The other thing that we added was a semi automated pipe handling system. And, at that time, there wasn't really much on the market in the way of pipe handling system, for Byron Jackson had built a little pipe handling system for land Rig use to work with Humble rigs some years earlier. And so, we worked with Byron jackups ands said, we'll design it. Offshore Company's John Gadbois will do most

of the design, if you guys will fabricate it and make sure we are building something that can work when installed in the derrick. So that then was the system that actually had the strength to hold the drill pipe or the marine riser or whatever you were working with the kelly in the derrick, so that men didn't have to physically grapple with it to get it into the rotary table through the moon pool or whatever operation we were working on. So, we added this semiautomated handling system. The reason we called it semiautomated was that we had a man in a control booth on the drill floor that actually had sent joystick signals to run some of the arms back and forth. He, in effect, manipulated the arms and the their mechanical hands. Then there was a man that was in the derrick at the monkey boards level in another control booth… what we called the derrick man… He worked with the top of the drill pipe. When this 90 feet stand of drill pipe was hoisted up, he had to actually be up there to signal the fingers to catch and make sure that the drill pipe all got secured into the setback. So, it wasn't fully automatic. It is only recently that anyone has even come close to coming up with a fully automatic system.

We decided to add the automated system when we issued the shipyard contract in 1967. We finally commissioned the rig in Australia in 1968. And installed the pipe handling system then.
This rig then worked in Australia and New Zealand, and was called Discoverer II. A lot of the things we had added helped it operated, more efficiently than the first Discoverer.

JP: In this period, if you can kind of remember the days of the Blue Water 1, you've got … do you see each other's competing technology - the semi and the drill ship - as just complementary and for different things?

TP: I think they were competing technologies. Before I answer that, let me go back to the thing you said: Is that the same turret we used? In Discoverer II, we used exactly the same turret. In Discoverer III, which was 374 ft. long we used the same turret. The same drawings. Discoverer IV, which was built for a client, and V, used essentially the same turret. And then, we built the Discoverer 534, for that

one we did basically use the same turret design but we expanded the size to accommodate the larger equipment and loads we were contemplating. The Discoverer 534, as you can guess, was 534 feet long. So we had gone from 356 feet to 534, and Rig was completed in 1975. And the Discovery 534 eventually ended up with the record for drilling as a moored vessel in 3400 feet in 1976. So, that is your next quantum jump in the water depths as far as drillships are concerned.

Getting back to this thing between semis and drill ships the drill ship was less expensive, it was easier to move from location to location, and our company seemed to think that this was the way to go in the floating mode. At the time, we were going into deeper and deeper water with our jackups. There was just so much money thatyou can spend …at that time, most of the equipment we built was built on speculation. So you didn't build a great number of drill rigs, maybe one or two at a time.

JP: Did other companies come into competition with you building the same kind of ships?

TP: Nobody ever came in competition with us on the turret moored drill ships because we had a patent. Even when the Discoverer 534 was built, which was built as a response to an inquiry to, at that time, Exxon …I guess it was Esso then …the paper documents that they sent out required the other bidders to get a license from the Offsore Company. which we did offer but I don't think anybody else was extremely interested because they felt that we probably had a lock on the deal. And we did get the contract and built the 534. And it was built as a result of the contract with Esso.

As early as …well, we go back …we knew we were missing something in semis, so we ran through some studies. We moved from baton rouge to Houston in 1962 and I would say by 1965, we had done a pretty good study on our own semi design. We brought in a fellow named Harry Reinecke. Have you run across his name before?

JP: Yes, I have.

TP: Harry was quite a guy. He is a friend and fellow traveler of George Richardson. Harry had come in and worked with our naval architect. At that time, it was a fellow named Joseph O'Reilly. And they had designed this semisubmersible. Eventually, about three of those designs got built, or maybe four of them got built – penrod semis. But they ran a bunch of model tests of the semi design and they took films of the motions when they were doing the model tests. I can't recall if I was in the room or heard about it later. Our president at the time was Henson Moore. He had taken over after T.S. Stoneman died. But they were showing this model test film. They got into this 30 to 40 feet wave sequence or something like that and that semi just almost bounced out of the wave tank. He threw up his hands and said, "I'll be God damned if we'll build anything like that!". So that project got scrapped.

After than we kind of went lightly on the concept and stayed out of the semi market and watched SEDCO become the dominant semi player. Every once in a while, we'd think, gosh, we've got to get in this Semi market. Finally, in 1972… It might have been 1971… Shell put out an enquiry for three semis. They were going to sign three drilling contracts and we went to the Hague as we had been doing it every winter, when Shell came out with some kind of inquiry. We had gone there the year before and tried to get the contract for a dynamically positioned drill ship, And, at that time, Sedco got the Shell job with their Sedco 442.

O the next year, we were there competing for a semi contract. We were obviously not in the technical league of the other people building semis at the time. And so, Shell kind of took us under their wing and said, you guys aren't getting the right kind of motion curves. There is something wrong with your basic design. They gave us 30 days to go home and figure out what the hell we did wrong. Luckily, at that time, we had a couple of really savvy hydro dynamists on our staff that said, yes, here is what we've got to do. So we pieced together what eventually became the "Chris Chenery" and went back to the Hague, with our new motion curves. We had worked with Davidson Laboratory in the New Jersey

and ran the model tests and got all that worked out on the redesign. It was a terrible ordeal to get all this done in such a short time.

We got back to the Hague and Shell said, well, it looks pretty good. Now, we've got to find a place to build it and figure out a price for the construction. I am slightly digressing chronologically here. After the Shell meeting, I left the Hague and went to Spain because Shell said they thought there was this available shipyard space in Spain. It turned out that Shell was working on getting a concession with offhsore Spain and it would enhance their position if they could have a rig that was going to be built and used in Spain.

JP: [Inaudible].

TP: Yes, so it was what they called low stress, high cycle fatigue. And for steel structure there used to be, what the engineers called an "edurance limit". As long as you kept your cyclical stresses below a certain endurance limit, you didn't worry about fatigue cracking. Well, we proved that concept didn't work anymore. If you had enough cycles, even though it was at low stress, it would tear things up. So this Chiris Chenery worked but I was always pretty worried about it. I had it designed. I had the whole upper hull made watertight. I figured if we lost a column or lost a leg or whatever, at least the rest of the hull that sank down in the water could still float. And eventually, that water tight upper hull kind of became the standard in the industry as a safety feature.

JP: It makes sense.

TP: That was, I think, the only catamaran-type …well, and the one in Spain that finally got finished. It was while later when they drilled for chevron. The Afortunada was eventually sold to Neodrill and they modified it by adding ties between the lower hulls.

When the Chris Chenery fisrt came out it was heavier than we had initially calculated. This ended up causing a problem we called :Bi-stable Roll". The Rig would just roll over about 5 degrees and the oscillate back and forth around that new roll axis. With model testing we solved the problem.

I can't tell you where the Chris chenery is today. It was sold to someone in Indonesia, I think. But it was a very innovative design, I think, but our company just had not gotten into semis, and we were getting left at the post with the semis. And it wasn't until about 1985 that we went back into the semis and designed, in conjunction with an outfit called GVA… Gota Verken Arendal. Actually, they did the design. And then we added a lot of features such as a combination wire chain mooring system that had the chain in chain lockers and the mooring wire in the lower pontoons just to keep the vertical center of gravity down and all this. We had ordered six of these and eventually, only two of them got built. And right now, they are capable of handling, I think, drilling in 5,000 feet of water, in non-severe environmental conditions in the Gulf of Mexico.

At that time, I was primarily involved in what was called the business development and had the position in the company. Because of my engineering background, I was very keen on making sure that we built things that technically worked. And I did end up doing a lot of the engineering type, checking and double checking, and was the one that insisted on this particular mooring system. I actually got the quotes for mooring system that was incorporated in that design. But even so, I think Sedco is still acknowledged as the semi leader. Well, I don't know if they are anymore. The GVA has come up as a leading designer of semis and a lot of people are using their designs now. They are able to use the semis with only the four columns in the corners and all this and it seems to be the most efficient way to build semis.

JP: What is the name SONAT?

TP: SONAT is the acronym for Southern Natural Gas. SONAT. And it was in 1984, give or take a year, 1983, that the longtime chairman of Southern Natural Gas retired. The new chairman came in from the outside. He had been on the board of directors. He came in from the outside. And so, he was going to put his stamp on everything. So, the Southern Natural Gas Company became SONAT, and then all the subsidiaries became SONAT Supply or SONAT whatever. We were SONAT Offshore Company. So, that is where that name came from.

JP: That is interesting. You really see that with Microsoft and with Standard Oil. It is very valuable to have that offshore company, being an offshore company ...that is a great tag to have on, The Offshore Company. A good name can earn all kinds of money for you. I was going to ask you to try to think through the connections, but all of this drilling ship technology .with Mohole over here briefly .all of it does point towards the TLP design sooner or later. There is bound to be a lot of cross-fertilization in the two.

TP: Well, before we get onto TLP, just to follow my chronology with the company, it wasn't very long after we moved to Houston that it became obvious that we needed a 300 feet jackup for SONAT. There weren't any real hot projects on the burner at the time, and so I kind of was assigned, I guess, or took on the assignment. And somewhere along in there, I became assistant chief engineer or something, so I had a little bit of say so about what I was doing. But trying to design a jackup for 300 feet water was a challenge. The design went through a number of iterations. Actually, I had started working on this back when we still were in Baton Rouge because we were looking a way to get into deeper water. We were basically a jackup company. For a jackup, you pretty much drill like you drill on land. All you've done is you put all of the equipment on a platform and it's got legs and it sits still

and it just provides a stable drilling platform… That is what we wanted to have. The floating thing just came along because it was a necessity to compete with other people. But still, we wanted to be jackup company… I know back in some of my old files, I found preliminary 300 feet jackup designs gong back as early as 1963 or even 1962. I have a preliminary one using only large tubular legs as opposed to lattice legs. A hopeless concept.

Anyhow, it was apparent that this was something that we as a company were looking for. The structure just got so mammoth. So, I got back into figuring out, well now, where do the loads come from, and this gets back into this Rig 54 and Audrey and all that, I realized if could just make these tubular lattice members that make up the jackup legs small enough it would cut down the wave loads immensely. And so, this then leads you into the lattice leg design because you can make very efficient structure that is more transparent to waves. And then, if you can make the concerns of each lattice even smaller, that would be the frosting on the cake. And that is when we start looking at using very high strength steels for the corner chords.

The first design I did was using what was called at that time T-1 which was a U.S steel product – 100,000 pound per square inch yield strength steel. And gosh, you could just go through and reduce what would have had to have been 56 inch diameter chords when using mild steel three corners of each triangular leg lattice down to inches diameter. And so, at that time, it was the practice, at least in our company and I think most companies …you go through kind of a preliminary design and estimate the amount of steel that would go into the legs and you would estimate how much goes into the hull. And hulls, we estimated on pounds per cubic foot. I mean, the standard number was at nine pounds a cubic foot of hull. The jack houses 15 pounds a cubic foot. And the legs you actually did make a material weight take off. But then you go back through and you use some kind of multiplier, $500 a ton for the whole fabrication and $600 a ton for the leg fabrication andall that and you come up with your cost estimates. And so, using this kind of, in effect, slide rule technology, we were able to design and cast a jackup for the desired water depth and environmental conditions.

End of Side 2

Tape #2, Side 3

JP: We are continuing the interview with Tim Pease and we are talking about the design of the 300 feet jackup and the jackup sector of the industry in general. TP: Yes. At that time, really the only competition, I think, was the Letourneau jackups, and they had been pretty well designed, from best I could tell, on the back of an envelope and just gotten scaled up bigger and were drilling in deeper and deeper water. In mu view, Letuorneao used very primitive construction techniques where they built these things in Vicksburg such as they way jacked the rigs into the river even launch them, and they just tore the rigs up as they were putting them in the water and would weld them back together. And we heard that the rigs were always breaking their legs and everything on location. And they just had kits at Letourneau that they would send out to fix the legs and all this when an accident happened. They were the only real jackup designer except for our company. Our stuff was still in 150 feet stuff that was about as far as you could get with the big tubes the single tubes. ethlehem a mat supported design that used tubular legs, but at that time they were pretty much limited to 125 ft.

So, we were trying to design this lattice leg version and we came up with a three-legged design using this 100,000 pound storage yield strength steel, T1. For the chords we did not have a drafting department so we went to New Orleans and McDermott and worked with a guy named Griff Lee. You probably have run across his name. He made a couple of his people available to our naval architect and myself. We had enough drawings and things that we kind of knew what the arrangement would be and how it all worked together. And I think we spent like two weeks down there doing that and we came back to Houston .

I think I mentioned it was a three-legged design. The triangular shaped rig with legs in the each corner, which was pretty much the configuration that Letourneau was using. It was obviously cheaper

if you could use three legs instead of a greater number of legs because for the total construction steel weight of jackup, each leg pretty much contributes its percentage of the load. So, if you've got four legs, you've just got 25% more steel weight to pay for than you do if you have three legs. So, we got to looking at what we wanted to do with that thing and the first thing we found out was that nobody could actually roll bend the steel of that strength into the small 30 inch diameter. There weren't any steel tubular rolling fabricators who could actually roll that strong of steel into that tight of a circle. In effect, you were making pipe out of the real high strength steel. And so, we had to back off on the strength of steel that we were thinking about using.

I can't remember the exact sequence but we started receiving some feelers for the design in the North Sea in, I think, 200 feet of water. So, we brought in another fellow, a guy named George Stetson, and asked him to help us lay out a rig. He did about two drawings in the way of arrangement. Anyway, at that time, we pretty well decided we wanted four legs jackups. There were features about the four legs that provided more than just the fact they were safer. For example a 4 leg unit could go on location and you could jack up to the diagonally opposite legs until they were preloaded for a jack up, you have to drive their legs into the soil, to preload them to guard against later soil failure. And so, a four-legged unit can preload itself and can drive all its legs in; where as we had several years earlier…built some little three-legged tender support jackups for them you preloaded the legs the same way Letourneau did which was to actually put in the corners of the hull in tanks adjoining each leg, you filled water in the tanks or just let sea water flood the tanks and then shut valves and hold. As you jacked up this way you put this extra weight on i. Or maybe use the drilling rig itself to skid out over where the legs were being preloaded to help out the extra weight on these legs.

But this is time consuming you don't always get enough load to really fully preload. But with a four-legged design, you can get full preloaded easily. So our company became kind of the four-legged company. But at that time, we were still looking at building a rig on speculation and didn't have a real client. So we were not in a great deal urgency to do it.

In the meantime, we had received a contract for Shell in Nigeria. We were converting one of the small Shell jackups, the Triton, so it could work with one of our drilling tenders. And I was in the Hague working on that. For the Hague I had pretty much before I left, designed the legs for a 250 feet unit so that we thought it could be built. We could only do this a leg chord steel that came to be known as Super-low-temp. And by using this steel chord diameters got down to 36 inches, which was a nice size for minimizing wave loads. I was in Hague doing this the project and the company a phone call that all of a sudden, Phillips had expressed an interest in our jackup design for the North Sea. In order to obtain a North Sea concession from the U.K. Phillips wanted to build the jackup in U.K.

JP: At Ecofisk?

TP: No, it was way before EcofiskIt was Phillips U.K . And there were not any jackups really suitable for the North Sea at that time. There were not much of anything going in the North Sea. So I went to London. We had a small office in London. Our company, and again, back to the history of The Offshore Company had bought, a company known as the International Drilling Company (IDC) was the drilling company that National Supply put in business. To use National Supply manufactured drilling equipment. IDC only operated overseas and had a number of land rigs and one small jackup and one medium size submersible barge. Henson saw IDC as our entrée into overseas market. With the exception of the Persian Gulf, the offshore drilling industry was pretty much confided to the Gulf of Mexico.

And so, back in 1963 we bought Internal Drilling Company. It had been pretty much of a handshake agreement, where we had pretty well used National Supply equipment prior to then, now we had a lot of National Supply manufactioned equipment. So because we bought IDC we had a small office In London. It was pretty much just an accounting guy and a secretary. I went over to London from Holland and started contacting all of these U.K shipyards, which I never heard of, to see if I could find one that could build our design for 200 ft. water in the North Sea. Initially I was not doing a lot of good finding one

On the last day before I was getting ready to come back to the states with the slim pickings I had with the yards. This is kind of an aside but, to me, it is interesting ... This little guy in a Bowler that came walking down the street, and I had an office like this where I could look out over the sidewalk right there on Park Drive, which is just a few blocks from the Grosvenor House Hotel where I was staying. This man came up the steps and heard him ask the secretary, "Is this the company".. he had a thick Scottish accent…. "Looking for someone to build a drilling rig?" And he said he had a wee shipyard up in Scotland that he would like to tell us about. So, I ended up meeting a guy name John Rainey he eventually was knitted by the queen for all his achievement in the ship building business. They built the ocean liners Queen Mary, Queen Elizabeth and QEZ.

So anyhow, I found myself across the desk from John Rainey and he was keenly interested. I gave him the little design package that we had at that time. It was not much more than the layout – a few hull steel thickness and some leg sketches which I had pretty well done myself. That was all that was finalized at the time. He tucked this information under his arm and left, and by the time I got back home, well, he had submitted a construction price based on so many dollars per ton of the whole structure - this, that and the next thing. And so, within a few weeks, we were back over in the U.K. with full sets of drawings and finalized that contract. And then we had a reception at the Les Ambassadors Club, which was supposed to have been the place to dine and entertain in London at that time. And the Phillips representative and his wife were there, and about half dozen more IDC people including wives who happened to be in town. We had a large table and celebrated the contract with Phillips and putting the whole project.

As kind of an aside and this will be off the record but during that evening, my boss, who was a real good—looking guy – George Richardson – had been an ex—collegiate heavy weight boxing champion. When he was in college, and had gone to the Coast Guard Academy. When he got out of college, he went into Coast Guard. And then he went to work for Humble Exxon later. Then he came to work as

the vice-president —at The Offshore Company, and he was the guy, like I said, that hired me. But he was there, I was there, and the guy that was our manager in London, had come for the occasion. I guess it was about the three of us. And maybe the office manager from Rome was there.

And then we had this other guy, Charlie Campbell, and wife from Phillips. The Les Ambassadeurs had a dance floor and there was a lot of ambience at this place. George had asked Charlie's wife to dance, which is kind of an accepted thing you were expected to do. They hadn't been out on that dance floor for two minutes when George came hustling back to that table and he said, "What the hell is going on with that guy?" Charlie went out there cut in on George right then he was furious that George was dancing with his wife. I'll never forget
this.

George was so upset about that. And so, he had to catch a noon time flight to get back to Houston the next day.I remember he was down at the office about 7:30 in the morning so he could go by and see Charlie Campbell at his hotel room before he caught the plane to apologize for whatever the hell he had done 1 That was an interesting little sidelight of what went on getting that contract signed.

So, that ended up being the first jackup that was built to work in the North Sea and the first one that we had used or anybody had used, using these special steels. We had really gone into the details of the notch toughness in steels and fracture resistance and all that. So, all of the legs were built out of very special steel and special welding techniques and all this. And in our history which I have sent to Malcolm, I have asked him to contact the guy Dave Crawford that did all the welding details and what have you. Dave went on and he ran the Letourneau yards Singapore. Dave paid a lot of attention to the welded connection of all these steels. We were fearful of the low temperatures and brittle fracture and things in the North Sea as opposed to what you would run into in the Gulf of Mexico, where you could get away with much less attention to detail in because it doesn't get that cold.

JP: Did the shipyard become a major builder of offshore?

TP: It built a lot . . well, not a lot . . . for us, it built a lot. It built North Star and Constellation which then we go from the . . . North Star was a 200 feet rig, Constellation was a 250 feet, and the origin was a 250 feet. It eventually upgraded to 300. So, John Brown built those three rigs for us, then it built the first self-propelled rig for the industry for us, the "Mercury", in 1969. Essentially we took the orion and North Star designs, combined them and added a bow, strew and self-propulsion machinery. This jackup could add its own upper leg sections when it got onlucation after an ocean voyage. It could flush with the bottom of the hull. You had to have large footing son the ends of the legs for mud bottoms. The footings were removable and could be recessed into the hull. For hard bottoms, "Mercury" chugged its way to the first job, self-propelled from Scotland to Argentina. And jackup without assistance so, John Brown built that rig too.

And then under license, you asked about Ecofisk. John Brown built the Gulftide which was a little bigger version of the Orion and it was buit to drill for Gulf Oil. Rimrock had the drilling contract and we had our licensing contract with Rimrock. I don't know if you have run across the Gulf Manager's name. It is Virgil Stone. Try to get him in your history somewhere if you are ever doing a history. He is a real piece of work. He was an engineer for Gulf and eventually became president of Keydrill Co., a drilling contractor.

Virgil was very, very good, but he was also tough on enhancing drilling penetration rates and drilling capabilities and all that. So then, the first rig that was built for them in the North Sea was built with him wanting a little bit extra of this, that, and the next thing . the legs were a little bit longer and the jack houses were a little bit taller.

Jack houses themselves are pretty interesting design structures because when jackup they have to transfer all the elevated jackup weights to the legs. They've got to hold the jacking assembles, guides, etc…. Then, when you are floating on the hull, the jack houses have to be the structures that hold the

leg "antennas". The legs when floating are waving back and forth, and the leg may be 300 feet long. It is pretty interesting loading situation. You have probably seen pictures of these things under tow with these legs sticking way up there and it just looks like the whole thing ought to be…

JP: Yes, it doesn't look right.

TP: Anyhow, Virgil kind of added to the Orion specs and they built what is called the Guiftide, and that became the rig that found the Ecofisk field. If my memory serves me, it was going to be the last well they drilled in the North Sea. They were getting ready to shut down. The North Sea was almost ready to be shut down as being a dry hole.

JP: They went back after the winter and proved it to themselves that they didn't want to stay and then they just used the Guiftide as a temporary production platform.

TP: Yes.

JP: It is pretty amazing.

TP: The Gulftide cracked a bunch of the leg braces when working as a production platform. And thwn, we got involved in going back and getting into the fatigue analysis and related Gulftide structure. Usually on a jackup, we didn't worry too much about fatigue because you figured you'd drill here or there for three months and then you would move to a new location. So, the highly loaded area, which is the section between the top guide of the jack house and the bottom guide of the jack house of the leg moves to a new zone of the leg at each new location. So you never get the same leg members loaded all the way… When they left the Gulftide on that location, they had a problem. So, to answer your question, they built the four rigs for us I remember, they built the Guiftide, and they built what was called the Ocean Tide which was a self-propelled version of the Mercury of the Rimrock. So they built

only six rigs, but I suspect that it was, by far, the greatest number of rigs ever built in the U.K. by any shipyard. I am sure it was.

JP: What has always interested me as a business historian that the guy comes and finds you and all kinds of good things happen.

TP: Yes.

JP: Just had a little insight that these people might actually be onto something that might be an interesting

TP: Well, we, of course, sent out feelers but we hadn't heard from them.

JP: Somebody got enthusiastic about it..

TP: But it was the kind of thing where I didn't know enough about the U.K. Shipyards. I just got out the directory of shipyards and I think sent out, at that time, we still sent out telegrams.

We had yard like Cammell Lairo Shipbuilders, Ltd. I remember talking to Smith's Dock Ltd. As mentioned we talked to John Brown Co. I think John Brown Co. was the cream of the crop at that time. We had a lot of trouble building the legs for the "Mercury". So I spent a lot of hours at Clyde Bank at the shipyard. While killing time it was really something to prowl around those big old liners. The Qezwas being built during our stay there. And it was quite an impressive fancy ship.

JP: Where was it?

TP: Clyde Bank is right next to Glasgow.

JP: Oh, O.K. I just came back from there.

TP: I guess you could call it Glasgow. Clyde Bank was actually a little subsidiary of Glasgow. They hadn't built that big bridge that goes across the river back then. So, if you had to get across, I forget

how you got across. Probably ferry. There was also a tunnel, it was very interesting working up there with those guys and they were super first class people to deal with.

JP: But they didn't build your self propelled?

TP: They did. Yes, they built the Mercury. Actually, what happened on the Mercury was again, we were looking at a way to build a spec rig and the cost estimates that came up at that time were too prohibitive as far as the DCF calculations and what have you, for the board to accept. And I can't recall the reason but I was again in the U.K. I don't know if it was John Rainey or somebody else who put a bug in my ear …why don't you build it selfpropelled, and then the U.K. government will give you like a 20% subsidy or something? It is a ship building subsidy for self—propelled vessels. So, you know, it was something that we just hadn't even thought about. And so, I talked to John Rainey. He got all enthused, and then I got on the phone and talked to Houston and they started going through the applicable laws and seeing what would work and what wouldn't work.

Rainey in the meantime, cranked up a little model, had it built, of a little self-propeller jackup with a bow and a stren on it and propellers, ran some test. I got up to Clyde Bank and we looked at the tests. Then, he got some films made and we had them sent back to Henson in Houston. So, Houston got all enthused about getting the rig built. Because of this inducement on getting a 20% saving on the construction cost, we had calculated the cost of building it. Even though it was self- selfpropelled, it didn't cost very much more than one of our Orion-type jackups.

I remember then, we went to New York to the next board meeting and presented all of this to the board of directors and we got approval to build what became the Mercury the world's first self-propelled jackup. So that was another little thing that was pretty innovative.

I ended up doing almost all the design for the mercury at that time our company had a number of engineers but we were just so busy doing other stuff, that rather than wait on some other engineer to crank out stuff and because of the time constraints and all that. I would take my old North star calculations home at night and mark them up and talke old drawings and almost just by rule of thumb, mark them up- howing that we were going to bulid. And probably, in two weeks time, got with the drafting department and got sets of drawing done.

We went to Scotland and I'll bet you within one month of having that first model test done, we were actually awarding the construction contract to John brown Co.

JP: We met to talk about Malcolm's list two days ago and I told him I was coming to talk to you today. He said to be sure to ask you why you thought the Offshore company was so innovative, why it seemed like for the reputation of the industries, that is the company that will do something that you need done.

TP: I can't answer it except maybe just the old trying to build something to attract the ... you know, the better mousetrap theory. It was strictly a matter of trying to get business. Well actually, in all fairness, the guy that did a lot of the creative thinking was this Henson fellow. Our President had anything on his desk. It was a clean desk. He was never bothered by a bunch of paper work or whatever that that might get him involved in details or whatever.. His whole time was spent thinking about how we could build other equipment and where he might get clients and who might need this. That is just what he did. And he did it very well.

He and I got along very well. He was a tyrant but he liked me because I could get stuff done in a hurry, I didn't think he was crazy ! And I know how to design things and he didn't and so, I am sure that a lot of this innovative stuff came out of his head he would say, well, how can we do such and

such and what do we have to do to do it. Because he had a client somewhere or some idea where he could sell something.

JP: A lot of times in history, you find the innovative, this culture of the organization, but a lot of it is being in an industry that needs new things, and you are looking out there and you see.

TP: Yes. There weren't any rules. We didn't have any regulations …could you do it? How could you do it?

JP: And this is an industry that has changed the past, isn't it? Going to the North Sea or going out in 600 feet of

TP: Yes. To answer Malcolm's question, I think I would have to give Henson all the credit for the drive and the innovation. Even the concept like the Mercury. The jackup, the self-propelled jack-up. He just took to that…he just loved that. He even insisted his name get put on the patents! And some of the features I think probably were his. I don't know or remember for sure but Henson had a lot of good ideas. He called me about one year ago. He just died within the last six months. He had read something about me in one of the offshore internal magazines. He didn't understand some piece of drilling equipment they were talking about on the new rigs and he wanted to know what that was all about. He was 80 or something like that. He was still interested. So, we had gone through that and about the same time, again, going back through that …I used to sit on airplanes and was amazed myself at the number of projects we had going on at the same time. But when we were building the North Star, there was a sister vessel called the Jubilee in Livingston shipyard in Orange, Texas. We had a contract with Union Oil. The name Jubilee was the name they picked. So, that is where that name came from. At the same time, we were interested in getting a workover company started that the jackup company could go and jack up near a platform in say, up to 125 feet of water, and stick the rig and cantilever that over the existing platform and do the workover work. Again Henson… someone had sold him on the need for this type rig. I think Dick Flippo, an old friend of Henson's sold him on

the concept. SO Henson hired this guy and put him in the office, made him president of the offshore workover rig department or whatever it was called and then he had to have a rig. We then developed the world's first cantilever supported drilling rig, the Hustler. Another aside it happened that Delong who initially owned 5% of the Offshore Co. had a fellow that worked for him… I never knew the man. Suderow had patented all of these different concepts. Suderow had just tons of concepts that got patented under Delong's name, so that we had inherited all of these patent rights. I heard Suderow had a heart attack at an early age, so he wasn't around when I got to The Offshore Company. I would have loved to have met the guy because he must have been something else.

He had patented the concept of a cantilever on a jackup coming out over the platform. The patent wasn't something that we needed since we were going to build that design anyhow. It just turned out we already had a patent on it. And we ended up selling a number of licenses on that concept to Letourneau later on. We built several cantilever-type rigs. Getting back to the story we then ended up with the "Hustler" under construction with a cantilever. And, again I did all the leg design. We did go back to tubular legs since the rig was only for 125 feet of water in the Gulf of Mexico. In order to optimize the size of the legs, we used steel Armco developed ID for us specifically. It is called QTC 80. It was 80,000 pounds per square inch tensile strength,. This was another innovation. We were just doing things to get other companies to work with us to help us develop the concepts. The leading name in drilling rig Derrick manufacturing, Lee C. Moore, were awarded the contract to do the design and fabrication. It turned out that the first time we ever tested the cantilever under load at the shipyard, some of the structural broke deformed and we had to redo the design for them. I had developed all the hold down claws and the guides that held up the cantilever on location, so the shipyard could fabricate them and build them into the hull. All this was going on simultaneously. Nowadays, I wouldn't even think of trying to do all that. It would drive me nuts.

So, we got up through that phase which was a growing phase. The Mercury got built in about 1969, I guess it was. I can get all the dates on it. Yes, 1969, the first self-propelled jackup barge, Mercury.

And it was also the first jackup barge equipment with mechanical leg connectors for leg sections, to avoid excessive time spent reinstalling and removing upper leg sections.

And then, the next thing we went on to do was trying to build these semis, starting in 1971. We were having problems with that and that is when we got this contract to build the Discover 534 for Exxon. But in the meantime, we had had a project in an R&D department designing a dynamically positioned ship. So we already had a dynamically positioned drillship design in our files. And then when this inquire came from Exxon, well, they thought they liked dynamic positioning but they weren't sure enough, so they wanted to have a turret mooring as well. And then we ended up building Discover 534 for them.

The next ship we built after the 534 was the Discover Seven Seas which was truly a dynamically positioned, but it had the same overall dimensions. You just lifted out the turret. So, that was when we finally ventured into the dynamically positioned drilling mode. I don't think it says it here. It must have been about 1976 when it was first commissioned. It was the first Marine riser built for 6,000 feet water depths, 6,000 feet. So, we got ourselves up to 6,000 feet.

For a long time we had, and may still have, all the world record depths for drilling. And then you had asked about tension legs and we can go back to that briefly. Back when we were having trouble getting this rig built in Spain, we had become enamored you might say, with the tension leg design. We just thought, gosh, if you could build a floating drill rig that could work like a semi but when you got on location, it would be like a jackup ..

End of Side 3

Tape #2. Side 4

JP: ...ideas behind the TLP.

TP: Well, we got pretty well hooked on that idea I guess, again because we didn't really have a good semi design or one that we were really too comfortable with, and we were just then getting the second one built. As mentioned, we had building that one in Germany. So, we came up with this three legged TLP. We went to the extent of doing extensive model testing probably the best model tests that were done on a TL, unless Conoco did dome later on, we came up with a lot of parameters that you had to satisfy such as the way you apace your legs and your vertical buoyancy,. All these things to make it work. And we did the model tests at David Taylor model basin just outside of Washington,D.C. It was the only tank in the world that could handle a model the size we wanted to use and test the things we wanted to have tested. Because of this we got sold on the concept.

In the meantime, we also learned that Exxon Humble had a patent Dick Knapp had a patent on some aspect of the TLP. Another company called Deep Ocean Technology had a concept patent on some features.

And then, Pan American had Amoco. A guy named Ken Blankhorn had patents on aspects of the concepts. So we had worked on with those three companies to get the order of magnitude of licensing arrangements to use their patents. Then, we prepared the drawings and actually went out to shipyards and got bids. At that time it looked like we could build a TLP fairly inexpensively. You know I can't say for sure but like, say a semi in those days could cost $25 million . well, we could have gotten this thing built for $30 million. But again, we didn't have a contract. It was a little bit more expensive than our competitors semisubmersible equipment. Even though we could make the technology work, we had trouble designing the connections between the rig itself and the anchor.

We worked out the anchors which were huge pontoons that could float or not float, depending on the ballast you put in them. And we had to fill them partially with permanent ballast. I don't remember the criteria, but we solved that problem. For the connection between these footings and the rig itself, we used chains. We just couldn't get comfortable that the damned chains wouldn't break. You've always heard this "weakest link" story. You really got to thinking, well now, this is going to have to hold this all together, and could it do it safely?

We started out with using three chains going down from each one of the corners of the TLP to the footing on the sea floor. So, you have a total of 9 chains 3 at each corner. Then you get to thinking about, well, what happens if one chain breaks? Well then immediately, you are in an unstable position. So then we said O.K., we are going to have to have four chains at each corner and then it got more complicated. That was a design problem that we just couldn't get ourselves comfortable with and, In the meantime we had even gotten a partner to join us in building and owning a TLP rig. This was the company that had bought up half the interest of the semi down in Spain. We had already gone into a joint venture with them building supply boats for the North Sea. They wanted to build one of these tension leg semis with us. We had a price from, I think it was
Hôlland, to build the rig. It was just that close … but we just couldn't quite.

JP: So, this would be a truly mobile TLP?

TP: Mobil TLP. We could de ballast the footings and bring them up under the columns. Then the unit would have been able to float on the footings .

And then, where this fits in the story I'm not sure, I think we had pretty well abandoned the idea of building a TLP because we just weren't quite happy with it. But shortly thereafter or maybe right thereafter, we had trouble mooring the "Chris Chenery", the one that got built in Germany. It started breaking chains all over the North Sea. And so you find out how these chains are so vulnerable. The first one that ever broke was on sea trials ! George and I had gone to Germany to go on these sea

trails. The :Chris Chenery" was in the Danube River that goes through Hamburg and all of a sudden, kaboom! We had been anchored overnight waiting on some more sea trials the next day. And one of the damn mooring lines broke. The rig jumped. I ran to that mooring winch and chain was gone. So, at that time we started getting on the Blohm and Voss trial master and I said ,"Oh, don't worry, the chains break all the time"…

So, not too long after we got on location for Shell. They had initially intended for the Chris Chenery to work in Spain. Since we were so late with our delivery the Shell contract got transferred up to Shell in the U.K.. Shell in the U.K. didn't want the rig and that caused unhappy client relations. And then we started breaking these damned chains. By then we were in the Norwegian sector working for Shell Norway.

I can remember going up to Stevanger and our crews had all that damned chain laid out there one winter day with some chain inspectors trying to check it and check out where the bad links were and do all this stuff. A Shell manager – I cant remember his name - he drove up there in his nice little heated car where I was standing out there in the snow, and he rolled down his window a crack . I accepted this comments as gracefully as I could.

I ended up going to Spain where they had manufactured the chains and then went to Sweden where the machines, the flash chain welding machines were made and all that, and getting educated on what the hell was going on in chain manufacturing. But as it turned out at that time, actually nobody knew exactly how the chain manufacturing process worked. In theory, it sounded good but what actually happened and what ought to happen wasn't the same. You are are taking big bars of steel, 3" to 3 ¼ inch diameter of high tensile steel and you bend these bars around to make a link out of them and then you put the two legs together and you flashed weld these two ends together. While you are pressing the stud in-between the two sides of the link. If all of this is not just exactly right, you get a big burn in

the middle of the weld. So, you might have only 35% of you strength capacity there but you don't know it isn't 100% O.K.. it looks just like all the other welds.

JP: And these modern TLPs, a lot heavier cables, a lot.

JP: Well, they used pipe, most of them.

TP: And also, not really mobile. They keep saying we might be able to move them and such but so far, they haven't really moved them.

JP: And also not really mobile. They keep saying, we might be able to move them but so far, they haven't really moved them.

TP: These existing TLPs used mooring lines called tendons. They are very carefully manufactures items made from pipe screwed together joint by joint. Some of them are actually preassembled and then floated on to location and raised vertically. Well, you have to change this concept in order for the TLPs to relocate themselves. With the chain, you could at least need the mooring lines in chain lockers and pull the lines in when desiring to chance locations.

JP: You can't always use chains and everything.

TP: Yes, but you can't easily retrieve these pieces of tendons that are you know, they are long and just pieces of pipe. I guess you could have some kind of racking system or something and set it aside.

JP: Yes. More likely you will write of the pipe, move the thing and start over.

TP: We got through all this. Design process and the concept aside, two years later, here comes Conoco and they are looking at the concept. Jack Mercier came along. He had heard we had done work on it and wanted Offshore Company to do a study for him. So, we did an engineering study for Conoco and pretty much sold him our brains. But we didn't sell the patent rights. So then they went ahead a couple of years later and started building the TLP. We started writing letters saying, hey what about our

patents, but they never even acknowledged the letters. So, since Conoco and DuPont were good clients of the Offshore Co. we just let it drop.

JP: There seems to be a lot of that in offshore.

TP: Yes.

JP: A lot of, 'well, the patents are there but in the long term, you know.

TP: Yes. We can't go back to suing Conoco.

JP: That is what I was saying ... the articulated Stinger, Shell and Brown & Root. Everybody seemed to argue about that but nobody ever sued. They'd say, well, we need each other. We'll be all right.

TP: The drilling contractors needed an oil company. As I have always said, in my next life, I am going to come back and work for an oil company. Well, the bottom of the feeding chains was the shipyards, drilling contractors could boss them around. When day rates were so low the oil companies were saying, "No, we can't afford better drilling rates" However when rig supply is very tight it seems the oil companies can five times more, even without great increases in the price of oil.

I can remember when Esso… going back to when I got into the contract end of it full-time. They were beating our day rates in Indonesia when we were getting $17,400 to $17,500 a day on a drill ship. I think that was Discoverer 3. We were saying, " What the hell are you guys doing to us". It was kind of like they were screwing around with us for $200 a day when we were already losing money.
Oh, it was not just us but some contracts manager was exerting his muscle, but they always had enough to pay for whatever they wanted to. And so, in the next life, there I will be. I'll be working for Exxon, Shell or somebody.

JP: I thank you for offering your time. Id there anything you want to add for the tape, any final reflections on your…

TP: What else did I say our letter? I think I mentioned the fact that one of the things I was proud of was developing the number of people that learned how to design all of these different types of drilling rigs. I had prepared our own design manual for the Offshore Company Going along, we got a bigger and bigger staff and I couldn't keep an eye on everything that was going on. So I had to have the manual, I sat down and just made up chapters on different kinds of rigs and different kinds of things that you had to look at in anything that we designed for our company that had to meet design certain criteria. An engineer named Bob Bradbury did the non structural part and Dave Crawford did the welding part.

So, we did have our own …I wish I had kept a copy but we did have our own book. It wasn't that big. Maybe 25 pages or 30 pages with lots of references. Some of the guys used to want to get us into the publishing business. I thought, gosh, we ought to get together and make up a real offshore design manual, not just for our company and get it published. We never got around to it. Much of our procedure was incorporated by ABS when they wrote their first set of rules for offshore rig design in 1968.

This is something I think that, through all the committees I was on and through all the people that would pass through our doors, to learn the business and the things that I did that were probably of the most lasting benefits would have had to be with getting myself educated and getting other people educated and getting involved in all these new and, at that time, different novel ways of getting in deeper and deeper water We provided something of a school for the Offshore industry. So that is something that I am pretty proud of . There was hardly a company there for a number of years that I didn't know their chief engineer or whatever and many times he had worked for me at Offshore times, these men went on to become presidents and vice-presidents and what have you for other companies.

JP: When you talk to different people, you understand how little of what you learned in school, how little of what you did of what was covered by what you learned in school. You had to take the concepts and just figure it out. I really see that in the pipeline.

TP: Well, you know, but the thing that is kind of interesting in that regard, Joe, is that I think a lot of the design are covered in school but you as the student just don't know it. Now, what happened was, in my case, after I got out of the navy and because I had a GI bill, and only because I had a GI bill that gave me an extra $160 a month, I went to night school where I got a master's degree, but I was studying courses and it always seemed like there would be some courses that I would be studying that had direct application to things I was doing at Brown & Root. And you learned how to do things because you were going through this text, and then you would find yourself using that text to help you solve engineering-type problems there at Brown & Root. And so, it became a lot more real than any hypothetical problem. If you were doing your studying and, at the same time, trying to work a problem at work, if it somehow tied into your job.

Of course, a couple of things in particular – advanced strength materials. I remember that course had a lot of use for me. And then one called rigid frame analysis, I think was the name of it, which became very useful to me in The Offshore Company in how to analyze jackups and going through these quick methods of finding loads and doing things. So I think if you are working along at the time when you are taking the courses, or within the last six months or so, it is a lot more likely you will find that the courses are useful than if you wait five or six years before you have a chance to apply what you used in school.

JP: The first project I ever did like this was for Con Edison in New York City. All of those guys are going through the union which is kind of like Rice is with free tuition, night school – there was a lot of night school – and they all went six or eight years to school while they were working for Con Ed and they would all say the same thing – they were teaching the teachers also. They said it was going back and

forth all the time because they were practically designing the biggest generating stations in the world at the time that they are learning all the theories and things.

TP: My daughter was down here the other night talking about the different relationship between competitors now when compared to the way it was when I was working. One of the things that seemed very interesting to me about my time frame was that those of us that were in kind of leadership technical positions in the various companies knew each other, most all of us are good friends, and if we got ready to get into a field that we had not been working on, you would always call up on the phone and say, "What criteria have you guys used?" I could call a guy at Odeco and say, "We are having some usual roll on the "Chris Chenery". Real weird, you know? What kind of criteria are you guys using for the center of bouyancy and the CG?" So we would say, "Well, we always have . . ." this, that or the next thing. "Why?" "We don't know. We have never had your problem." But anyhow, there was always this kind of communication and a lot of it was because we worked on committees together with each other. I never felt reluctant to pick up the phone. If it was a dynamic positioning problem, I would call the guy with Global Marine.

JP: Yes, you could see that all through the interviews and the history. There might be a small group of people because it is a pretty small group. It might just be that the problem is so hard and unprecedented that you are looking for help wherever you can get it, but it is the word "fraternity" always comes to mind.

TP: But you never had a reluctance to help somebody, like you were giving away your trade secrets something like that.

JP: It was like on the onshore oil industry where it is a lot more competitive or secretive. This could seem like a fraternity in the engineering part of this. They understood they were all moving out there together. It has been pretty exciting. I guess, watching and listening right now, it must be pretty

exciting right now again, just trying to figure out what is going to happen in the next 10 years. A lot of big questions suddenly on the table that we didn't think would ever be there.

TP: What is amusing to me is that, it was in about 1980, that BP had come out and published a paper saying there would ..never be any oil found in water over 2,000 feet deep that would be commercial. And so, boy, that just shut the industry down for a long time without trying to get out in deep. water. The theory they had was something about the geology and how it all worked together, but 2,000 feet was it. And now, you read about these guys out there getting ready to develop something that is in 7,000 feet.

JP: With all kinds of optimism!

TP: Well, I still talk to the people that ...especially the head engineer at SONAT also.

JP: When did you retire?

TP: Well actually, it was early retirement but it was one these things that when the oil bust happened, it was so terrible ...you would have these contracts for these big companies – Elf or Exxon or whatever, and go to visit them in Europe and they would say, well, you know, "We're going to finish this well and we may have to terminate the contract". And so, this negotiating terminating began on the possibility of these contracts. And the reworked contract would always be in terms that were less favorable. And so, that was started in late 1985 and early 1986. We had good relations with a lot of these companies. But the people we worked with had the squeeze put on them by their senior managements, whatever. So I said, gosh, I am just sick of this and I don't know what to do. I've been riding on the airplane all the time and getting very little satisfaction out of it.

So, it was about April, I guess it was, that the company had a big downsizing. And they were giving some other senior vice—presidents some early retirement packages. Our president at the time was named Bill O'Malley. He was talking to me about some of the management changes they were planning on. He was going to bring in another guy from one if the SONAT's subsidiaries to co-chair the presidency and Bill was going to move to SONAT's headquarters. I finally said, "Bill, I want get one of those early retirement packages." He said, "No, you can't do that." I said, "Well, I am 54. I will be 55 next year. So, you are either going to let me go now or I'll be going next year. He said, "Oh, you don't want to do that. Darlene won't want to do that. You go home for a week and talk to her and we'll get back together and work something out." I said, "I don't think I will be any happier one week from now than I am today but I will go home and think about it. As luck would have it, two days later, one of my jobs was to let go one of the top guys in my corporate planning department. So, Bill said, "Well, we will take care of that for you." I said, "No, I'll tell him." So I went into the office that afternoon, called this guy in and we talked. Got that done. Bill came by and saw me in the office and he stepped in. I said, "Bill, I have thought about it. I am not going to change my mind. I still want to go." He said, "Well, I don't know what we are going to do." So, a day or two later, he called and said, "Well, we think we've got it worked out. You can go ahead with early retirement." That was early in April and he said, I would like you to stay around here to the first of May. I've got a bunch of stuff I've got to do, and what have you and get everything organized. "If you can do that we will work you in one of these packages just the same as these other guys. It turned out to be a way better deal than… I had been there 24 years. So, it was sure way better than I thought or anybody else thought because my they gave me the full retirement as if I was 65 for our plan you got a certain percent per year. In 25 years, we maxed out. And when calculating compensation and a car allowance, a country Club allowance. They added every kind of fringe benefit they could to make these packages as big as they could. And gee whiz, I am sure when Bill got the numbers, he said, "What the hell have we done?" However he fully honored our agreement and I was happy with it. Well, I wasn't truly happy with it but I just thought, well this is going to be better than ..

JP: Particularly when it comes to firing people and watching people.

TP: That is bad however that portion, I can understand downsizing is sometimes necessary to survive.

JP: Yes, but then you have to do it.

TP: And I did it. I mean, that was my job, But to go and have your longtime clients put you through the meat grinder. It was just too hard – Wasn't fun anymore.

JP: Yes, no dignity in that. Well, I thank you for your time.

THE END