

FPSOs Present and Future Workshop

Minutes

Session II

Panel of Industry Representatives

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Minutes of Session II: Panel of Industry Representatives

CAPTAIN FANTAUZZI: Good afternoon to everybody. I'm with the marine services group of Chevron Shipping and we provide marine operation advice to the corporation on FPSOs development project. I'm honored to be here and share with you Chevron's experience. Our operational experience is based on -- Chevron has been involved in FPSO development projects since 1976. We have deployed 16 FPSOs, 13 conversions and three new purpose-built. Of these FPSOs, 11 are still in service. Some of them is not operated by Chevron, but the majority is still under Chevron control. As you can see, our operational experience is all over the world. Mostly it's in West Africa, in Australia, North Sea, China and Indonesia. All FPSOs are flagged but one, which is in the North Sea, and I think the reason has been given by the previous presenter. Our operational experience is based upon 25 years of operation of FPSOs internationally and 105 years of U.S. and international tanker operations. We have overall a good operation of record for our FPSOs. One example is ESCRAVOS LPG FSO which has been in service since 1997. 1050 days without shutdown and 1071 days without a loss of time injury. There is a discrepancy between the two figures is because the FPSO was on station ahead of a schedule and was manned before starting the mission. We have produced since the very beginning 986,000 cubic meter of LPG. LPG is exported by use of a prototype floating hose and this is the first LPG FPSO that was built in the world. It was quite a challenging project.

The key factor to the development of an FPSO project in our culture are two. One, know what you want. The second is proper project management. Know what you want means a well-defined design basis and technical requirements, the definition of the standards for construction and conversion, and identifying a clear operating philosophy, which goes with manning, maintenance, safety and so on. Project management. We learned that it is important to have the operator involved since the very beginning and it's also very important to manage the interface. On this topic we'll come back later. Communication and teamwork is also, but as I will explain later, on an FPSO two cultures work together and it's very important that marine and production cultures shake hands.

How we design our FPSO. All our FPSOs are designed, built and operate in compliance with our policy, which is protecting people and the environment globally. Each company has a similar policy and like many other companies, we are geared to meet this policy. Another important factor is we have to use effective -- we use effective and proven processes to validate our design basis and operational hazards. This from a duty factor is a lesson learned on other projects and includes from independent sources. Each FPSO development project has its own challenges. These are taken into consideration by assessing the reservoir and the field characteristics, the local environment and local regulatory requirements. Each FPSO is usually designed for a specific application and therefore the design basis and technical requirements are formulated on a case-by-case basis. The mooring, the process oil and gas export systems are customized for that particular field. Redeployment is feasible, but the requirement changes. We believe that moving an FPSO within the system is feasible, but it requires a lot of challenge. We have to recognize that one of the challenges particularly from a design and also from an operational viewpoint is the gap existing among the available standards and regulations, and also we have to recognize that the offshore technology is evolving rapidly. So sometimes it's not easy to find an applicable standard to a new concept. And the standards and regulations take time to be developed and this is from a project



developmental standpoint this sometimes can lead to problems. How we overcome the problem I have mentioned? We work very closely with all the interested parties to resolve the gaps or gray areas. And what I mean by working together with interested parties, I mean the host country authorities. Each country has an MMS and U.S. Coast Guard authority, so we work very close with them. We get them involved at the very beginning of the project. We work very close with the classification society, which in our experience has been a tremendous help and support in developing new concepts. And we work with the flag state administration.

One of our success story was the HAN HAI FAXIAN. This is an FPSO. We jointly with other operator Texaco and China corporation, we developed and pioneered new technology for a disconnectible system. There were no standards applicable for maintenance and inspection schedule. We worked closely with the specification society and we developed the specification and inspection schedule.

In general, as I said before, all our FPSOs systems are -- we use the marine standards with selective upgrades for the hull and marine systems. Applicable offshore standards are adopted for the topsides. For the interface, we apply the stricter of the two standards.

As I said before, marine and production cultures should shake hands and the two cultures have to recognize that they have a strength and limitations and they have to work together since the very beginning. Trying to impose one culture to the other leads to risky solutions. A lot has been told about the operators and as an operator, I would say that operations on an FPSO is challenging. The conventional offshore platform and seafarers in this environment are not qualified to operate an FPSO. Cross-functional is -- once again, they have to work together to safely, reliably manage and operate the FPSO facility, and they have to bring together the best of both cultures. My conclusion is that Chevron has developed global processes and policies that result in safe, successful FPSO operation. Not all our projects have been perfect. We had delays in a few projects. We have project overruns. But overall, where we have merged production and marine culture, the process has been very successful. We believe that local and international rules exist and these rules have to be selectively adopted in consultation with the regulatory bodies that have to work together with the operator. Thank you very much.

CAPTAIN HARRISON: Ladies and gentlemen, good afternoon. Thank you for inviting me. It's a pleasure to be here and welcome to Houston. Good site for this meeting. My name is Garth Harrison and I work with Texaco. I work here in Houston. And just to give you an idea of my sort of background and experience, we'll put up the next slide. It's effectively -- I don't want to spend a lot of time on this, but effectively I can say I've spent pretty well all of my working life in marine operations and fortunately, I was able to spend four years in FPSO operations in the South China Sea, and that is what this little presentation will be about. It should take about ten minutes. And coincidentally, my colleague on the platform here, Captain Fantauzzi, referred to the FPSO that I'm going to talk about and we both used the same words, "success story," and that's what I'm going to dwell upon this afternoon. You can see the agenda is very short and I will just hit the high points on each one of the agenda items.

There's the design basis. Very basic highlights. Key dates, key facts and some conclusions. The design basis was basically we had a 1974 vintage VLCC and, of course, by definition it was a



single hull vessel. The location was in 116 meters of water depth. It's in a hostile environment in the South China Sea. There are certainly more than 20 named storms annually. Frequently, as they go through the alphabet with a storm, each new storm will get through the alphabet and start on the next lot in a single season. And, of course, six months of the year are present northeast monsoons, which are northeasterly winds with typically 20 to 30 knots, seas, I don't know, 2, 4, 5 meters. It persists for over six months of the year and it makes the operations very challenging, but certainly very -- still manageable. And it keeps the ship aligned in that heading for quite a long period of time, which was very good for satellite TV reception. (Laughter.)

It is an internal turret. You've seen lots of examples of internal turrets today. No need for me to elaborate on that. But the prototype disconnectible mooring system was what Captain Fantauzzi referred to, and it is a submerged buoy mooring. You have seen an example of an advancement of that from the Norwegian presentations as it was the Norwegian developed buoy, but this was the prototype of that kind of mooring system; and it was disconnectible again because of the threat of typhoons. Still on the design basis, we had 1.5 million barrels of crude storage, tandem offloading. Again, you've seen examples and pictures of this today. A floating 16 inch hose. It was a 21-inch nylon hawser, 80 meters between the two vessels. And this is a key decision that is made or debatable decision that is made whether to integrate the marine and topsides utilities equipment. And I'm sure that will come up in some panel discussions later. Originally it was tied back to two platforms. Key dates. In late 1989, the vessel was on site. First oil was in 1990 at 20,000 barrels a day from the first perform. And then in 1991 it increased to 60,000 barrels. And then in 1995, with the advent of more wells coming on line and installations, more platforms, we shut the field down for about 75 days and installed the new platforms. During that time, we took the FPSO off site, went to dry dock, did some bottlenecking, did some process additions, took the opportunity to do some corrosion management with sandblasting and rip blasting and coking in the tanks and some new steel, brought it back and started up in 120,000 a day. So we doubled the production during that time.

And then this year the ship went through ten year ABS recertification of the hull and the mooring system. And that was done, incidentally, without a production shutdown. Key facts. I think these are very impressive. And as I saw the Petrobras presentation today, for which I congratulate Deborah, it was an excellent presentation. This single unit has done more liftings than everything in the whole of the Campos Basin over time and that struck me when I looked at this. So they've done up to last month 536 liftings and they've exported about 250 million barrels of oil. And as you can see, the gross sales are impressive.

We've had no production shutdown resulting from unscheduled marine systems service outages. We've had no adverse environmental events, which is a euphemistic way of saying we didn't pollute. And no sustainable demurrage claims, which are always present. And it's expected to remain on site beyond 2006.

I want to go back to the first point and qualify it. I was reminded at lunch that after I had left -- I was involved with this operation for four years and about 200 of those liftings. After I left, apparently there was a break out and there was a minor pollution, so I have to correct the record. So to conclude, it's a relatively simple design basis. When I say simple, I mean in comparison to the sort of North Sea and Canada technology that we're seeing with DP vessels and reels and all kinds of stuff, thrusters and whatever. This is relatively simple in design and relatively low tech. It's certainly very cost effective on the marine side of things. We only added about 30 cents a barrel. And it's obviously efficient, it's very safe and environmentally friendly. So that's my story. And



that's the picture -- we've been showing pictures of shuttle tankers all day, so here's another one. This is during the northeast monsoon Webber. That is at 92,000 dead weight tons, a Norwegian tanker. You can see the floating hose going to the midships manifold here. That's a 16 inch hose. And you can just see the mooring hawser and that distance between the two vessels is about 80 meters. What you cannot see but you have seen in previous pictures this morning is a tug on stern of the shuttle tanker, stern to stern with the tow line. And what that tug is doing or that supply vessel, as it is in this case, is maintaining just a positive tension on the mooring hawser to avoid dynamic loading as it would do if you didn't have it, and also to maintain directional stability or, in other words, stop the shuttle tanker fishtailing as it would if it didn't have that restraint.

And that's it. Thank you.

MR. WALKER: Good afternoon.

Unfortunately, as I got that fairly short notice, I don't have too many slides to show you, but BHP in Australia have experience in executing six FPSOs projects. We've taken one from inception to abandonment. We've sold three of them to Gulf and they sold them, and we've still got two which we operate, the BUFFALO VENTURE and the GRIFFIN VENTURE.

This is a slide showing where BUFFALO VENTURE is. BUFFALO is up there about as far away from Perth as you can get in western Australia. It's 560 kilometers away from land, which, as Paul said earlier, is a three-helicopter ride, quite a ways away. It's been a very successful property for us. Started up on time, under budget, and it's been a very profitable business. This is a schematic showing the development itself as an FPSO. As mentioned earlier, it's the deepest water FPSO we operate in about 300 meters of water. And we also have a wellhead jacket with two wells that we produce in BUFFALO VENTURE. And this is -- it's a permanently moored FPSO and that's the mooring. It's similar to ones you've been looking at earlier on today. And there is the whole thing. It looks a lot like the one we heard about earlier today in more ways than just the physical appearance. As we were building the FPSO, we also went to talk to Shell in New Zealand and understand how they managed to operate an FPSO with only 30 people on board. And we took those learnings from that exercise and BUFFALO operates with about 18 people on board. We target an average of 20. By contrast, this is the GRIFFIN VENTURE. GRIFFIN has been around for a little bit longer than BUFFALO. It's a purpose built FPSO and it's in western Australia in the Indian Ocean about 70 kilometers offshore and 1200 kilometers from Perth. As was mentioned earlier, GRIFFIN is a disconnectible FPSO and it's disconnectible for a very good reason. We get cyclones very frequently in that part of the world. Cyclone season runs between February and April, and this last cyclone season which has just gone, we were advised it would be a moderate season, we were expecting four to 15 and we had nine stoppages as a result of storms. Seven of them were full-blown -- were fully classified cyclones, two of which are Category V, which is as big as they come.

So the GRIFFIN VENTURE disconnected four times and each of those disconnects went without issue. In one of them, in fact, we disconnected before the shipper tanker was due to connect and so we sailed away with 650,000 barrels on board. That was the first time we had to do that.



Paul mentioned a couple of incidents that have occurred in FPSOs in Australia. The two incidents that he mentioned were an engine room fire and an offtake incident. They both occurred with the GRIFFIN VENTURE. That engine room fire happened last November and was a demonstration that with good design and good redundancy that the protective systems can work to contain what was a very, very significant incident. One of the five turbines we had basically disintegrated and pieces of turbine flew around the engine room and other pieces of equipment and a fire started. There were two people in the engine room. They were able to escape. The active fire protection system put the fire out and we shut down and unfortunately had to go to Singapore to mend it. That took four months. But the incident resulted in a sprained wrist to one of the gentlemen who were in the engine room at the time and no environmental effect. So it was a good recovery from a very, very serious event.

Since then, the GRIFFIN VENTURE has been on station for the last two years and we've had some purple patch production where we had 110 day run without any shutdown at all, which was very good for us given the fact the cyclones obviously stop us from time to time.

One of the things that was discussed right at the very beginning of the session was the relationship between the two regulatory authorities in this area. We've got a similar situation in Australia. GRIFFIN VENTURE being a disconnectible FPSO is regulated both under the Navigation Act as a ship and under the Petroleum Submerged Platforms Act as an oil installation. BUFFALO, because it's not disconnectible, it's permanently moored, doesn't have a motor, doesn't have any propulsion, is regulated only as an FPSO. I'll come back to the first one, the relationship with the regulatory authorities, and secondly, the industrial issues. The offshore industry is pretty heavily unionized in Australia and once having classified the installation as a ship, then we need to carry maritime crew. We have four different unions on board the GRIFFIN VENTURE and 40 people. We have a production team union, the maritime engineers union, the maritime officers union and the maritime union of Australia that look after riggers, everybody seaman, etcetera. We're at the moment trying to get to one agreement whereby we can treat all these people the same. At the moment, we have different bargaining agreements with each of these groups and that means that every time we have to renegotiate something or want to make some change, we get three in line and one says no, no, I don't like that. So hopefully, in a very, very short time we'll have one agreement that covers all four unions.

Conversely, on BUFFALO we're able to have a single union agreement because it's not classified as a marine installation. Now, that notwithstanding, we still need mariner skills, we still need maritime skills, we still have to have it. And we took the maritime model and we incorporated it into the crew design and it's made considerable benefits. Several of the speakers today have talked about manning. From a safety point of view, obviously if somebody's not there, they're not getting in a helicopter, they're not exposed to the risk. We have an average POB of 40 on the GRIFFIN VENTURE, average POB of 20 on the BUFFALO VENTURE, pretty much doing the same job. The fact that the GRIFFIN VENTURE can sail away puts us into a very different relationship.

There are other minor differences between a dual-regulated FPSO and a single-regulated FPSO and that relates to what Paul was saying about free-fall lifeboats. We have free-fall lifeboats on the GRIFFIN VENTURE. You can't see them. They're right at the very back. Under the Navigation Act which compels us to comply with ISO and IMO, we have to test those every three months. Like I said, it's 70 kilometers out into the Indian Ocean and although it's a pretty calm day there, it can be quite rough. And the opportunity to test those boats safely and recover them with



people inside are very few and far between. What we've agreed is that we'll come to a halfway house. So what you're doing, between the Coast Guard and the MMS and having an MOU to define what regulation will apply to it and in which circumstances, is very important.

Within Australia the definition of an FPSO is -- that's covered by the Navigation Act as something that's not permanently moored. And what we're trying to do with the review of the Navigation Act which is taking place right now is to get that written into the act such that if you are an FPSO and you don't sail away in the avoidance of cyclones, you are covered by the PSA and not the Navigation Act. The GRIFFIN VENTURE sails away for right about 20 days a year. This year has been more extreme than previous years. We've been authorized for over 30 years. In that time, it's a ship, it has a marine crew and it behaves like a ship. And when we do that, we have a transfer of authority. The marine master who we have on board takes over; the person in charge of responsibility sits back. We've worked under that dual-regulation system for six years that the GRIFFIN VENTURE has been in place and for the JABIRU VENTURE since 1987. That was covered under the Navigation Act until the PSA took over. We worked under it I think very successfully. The points that colleagues made earlier about operations input is vital in getting a successful project, and that was one of the key elements of the BUFFALO VENTURE success, and also the bonding of marine and production cultures. Which if you have a framework for doing it such as a common agreement under which each of the people are employed, it's an awful lot easier than if you have to go to check out each different group of union people.

Thank you very much.

