

FPSOs Present and Future Workshop

Minutes

Session IV

Panel of Certification Agencies

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Minutes of Session IV: Panel of Certification Agencies

MR. FORSYTH: Well, good afternoon. Thank you for inviting me here today. I was reviewing the literature that came with the invitation to come here and I noticed that the objectives of this workshop were to provide a format to promote discussion of experiences and concerns about how FPSOs are operated, the way they're operated, and for each person to sort of relate what their company had to do with the floating production units. And for the next few minutes, I'll try to give you a brief description of what ABS does as far as classification of these units. You'll be happy to note that I reduced my slides to you because of the great presentations to you. You don't need to see another picture of an FPSO by now.

There are approximately 145 modified hull FPSO or FSO units operating in the world now. These figures include the storage vessels also, so you may see a little difference between my figures and some of the others presented today. But of these 145, ABS has classed 63 of them. Most of the vessels that we have classed are converted tankers that are in this service. They're not all conversions, but the majority of them are conversions. We've had the most experience in that regard. And a study was done by our marketing group last December, went through the trade publications, notes from conferences and just most of the literature available, and it seems there's about 211 potential FPSO/FSO projects that have either been planned or studied or hoped for and are coming down the pike. And this chart sort of gives you that breakdown of these projections.

Now, again, these are potential projects and some of them are only planned. And you see the Gulf of Mexico has got a big, huge number there that may or may not come about. I guess we'll see about that. But this was the projects that were discussed in 1999. They definitely aren't figures, but they do indicate a trend for the direction of floating production and I think it's something we should be prepared for.

Getting back to ABS's experience. I'll try to break this down into operational years of experience. We take the number of FPSOs that we've classed, reviewed the design, do surveys on and for FPSOs, I guess we had about 170 operational years or classification of surveys and inspections; and for the FSOs, we're looking at about 240 operational years of experience. We do have some experience reviewing systems that are in the deep water. We have eight FPSOs now or classed FPSOs in greater than 1,000 feet of water and we have three that are in greater than 3,000 feet of water.

The classification, the easiest way to describe it was to break it down into about three different areas, the hull meaning the vessel itself, either new construction or an existing tank, and the mooring system. And we also class process systems as an optional notation. We don't require that you class a process system as a requirement to class the entire unit, but we would look at some essential safety systems in the process whether the process is classed or not. You'll find our requirements for classification predominantly in our ABS guide for building and classifying floating production systems and production of the facilities site. We have a guide for offshore facilities also. Now, both guides have been updated this year and we expect to publish sometime in mid summer or at least have them printed sometime in mid summer.



Notable changes for the FPSO guide are provisions for precise, specific design basis for the hull of an FPSO and the use of risk-based inspection techniques to support classification. Facilities guide has also been updated to be more in line with industry standards and also to allow inspection for maintenance class.

Getting to the mooring system, we do require that an FPSO have a designer view done by -- to make sure they can maintain it and keep the vessel on location. This is a little bit different than the older class designation that we used to have for tankers for storage systems. It was not also designed by -- (inaudible) systems that are predominantly in use today you've seen all day long. There are some turret systems, external or internal turret, or a spread mooring system, as Oceaneering just explained to us. This is generally used in a benign environment, as they said.

The brochure asked for concerns. I'm not sure "concerns" is the right word. They're challenges, I would think, and from our point of view, challenges for maintaining class for an FPSO. The first thing is period of time on location without dry docking. Traditional ships and tankers go in dry dock twice every five-year period, have the hull coatings renewed, steel work done. It generally hasn't happened with the FPSOs. They tend to stay on location for longer periods of time than anyone first believed. And it's much better if you incorporate some sort of methods for facilitating underwater inspection for dry docking, which is where we've been doing most of the FPSOs. Also, to remain off site for long periods of time, effective corrosion protection systems should be done in place and should be done at conversion or new construction. This should include coating systems and -- designers need to take into account from the very beginning that they won't be going to dry dock. It will stay out on location for quite a while. The biggest challenge is how to carry out structural and mechanical surveys on vessels producing oil. The ABS tries very hard to ensure that we never interrupt the process system, but we still have to verify the integrity of the hull and we can't with systems on board.

And finally, operational and regulatory issues. Here in the Gulf of Mexico what do you do to produce gas? Most FPSOs around the world include some means of flaring, which is probably not an option here in the Gulf of Mexico. And what sort of mooring system do you use? What do you do in the event of a significant weather event such as a hurricane? Do you use a disconnectible system like the guys in Australia use? Do you build it strong enough to withstand a hurricane? Do you keep a tanker for boarding on location? These are all things that have to be worked out with our friends in the Coast Guard and MMS and the industry. We also have pollution concerns. Of course, showing tanker operations during takeovers. And I guess the last challenge is coastal state regulations. I heard it here today that the OPA 90 and double hull tankers (inaudible). Possibly U.S. flag, possibly not. Those are my quick few comments here.

Thank you very much.

MR. CARLSEN: Thank you, Mr. Chairman and ladies and gentlemen. First of all, I'd like to thank you for being here today and having given such a full session this afternoon. I must say I was very impressed that so many people are showing up to listen to



a subject which is still a nonexistent subject. That must mean that there must be a lot of expectations and hopes for the future that this also will be one option here in the Gulf of Mexico.

What I would talk about this afternoon is mainly our experiences and also the challenges we see in the Gulf of Mexico relative to what we have seen in other places. We're talking about floating production, FPSOs, and it's just one common denominator, but I've heard today it's a lot of different things. It's conversions, new buildings. It's production down to 15,000 barrels per day up to 220,000 barrels per day. And those units are going in different areas of the world and they are completely different management wise, project wise, cost wise, maybe even from 40 million U.S. dollars or whatever for a small -- we have been involved in a 13,000 barrels per day concept in Africa to 700 million (inaudible). And they have completely different challenges. We talked today about also the concept has come in some kind of, I would say, discredit due to some recent projects. I will come back to that because I think that's very important to understand why that happened and to understand how it should not happen again, that some of these concepts have had cost overruns and time delays. That will be part of my presentation this afternoon. But I will also start to discuss what I think one of the earlier speakers talked about today, the cultural aspects. That comes both to the engineering part of the business and to the regulatory bodies. And before doing that, I would just very shortly about my background.

I am currently now the manager for the Americas, but for ten years I was head of the offshore department, offshore classification department in DNV, starting about in 1980. Then I was five years head of operations department. So during those 15 years, I had some experience from the ships side and I was also some experience from the offshore side. And I must tell that it is quite different. We see the same in engineering companies. They are quite tall walls between those two professions, which is reflected very much also in the projects we have seen. I would like to just draw a little on the history about the new buildings and -- because that's an area where you have large units, complicated projects, and something which may be similar probably also what we will see in the Gulf of Mexico. We have talked I think about the conversions, but new builds are clearly an option. So on the market share for DNV, the new buildings for FPSOs is more than 50 percent; and that has given us a lot of experiences, some good, some not so good, but all experiences are for the future. For the conversions, our market share is considerably smaller and I guess that's why they have not given me a graph for that.

(Laughter.)

But it's something about 20 percent for the conversions. So we have some experience there, too, mostly in China and West Africa and other places. The new buildings, a history. I think it would (inaudible) and that also explains some of the challenges you see because that vessel was orders as a ship in Japan. It was a discussion between the regulatory bodies and among our company whether it was a ship or an operating installation. It was built as a ship and it was gradually converted to be an offshore installation during the new building and on the way to Norway to start production. And that's not a very good way of starting a project, when the regulatory regime is not clear from the onset. So it came on field actually two days before the company was prepared to cancel the whole project. The bank had drawn out of it partly because there was so much discussion. Since then, however, it has been very successful and I understand now it has



been in the U.K. for a long time and quite possibly is going back to Norway. So it has now been operational for almost 15 years and made a lot of money for the (inaudible) -- but the way up to this conclusion was pretty difficult. And that explains a bit about not so much I said about the regulatory issue, but also the people involved, the people who came from American background and those came from an another background and was argued all the way through the project whether it was feasible to use a ship at all as an offshore installation. So just keep that in mind when you're starting on the project with an FPSO. It has to be clear from the onset, which I'll also come back to a bit later.

What it boils down to is that whenever a country comes into a yard, there have to be specific requirement. In all the years there have been a tendency and leave it up to the yard and to the owner's team at site to fight what is actually meant by it. That has created a lot of confusion, extra engineering, and I would say come back to also cost overruns, who pays for it. We heard from HSE U.K. about the safety case regime, that the intention which I think very much (inaudible) is to go for a prescriptive to goal setting regime. I think that was very effective and it created quite a different change in the U.K., but it may also for the industry be a little misleading because it may give the impression that now everything is functional requirements, everything is open for discussion and for special risk assessments. And it has happened over these projects that risk assessments, which I think is a very useful thing and I think has come also here to U.S. as something now being used, is something which is not necessary in order to couch special (inaudible) -- that is also intention after the PIPER ALPHA, to catch special hazards, but it is not made in order to replace standards.

And when you do those safety cases, you will find that a considerable number of those safety critical elements are actually covered by the present standard. And that's where I think that to go in prescriptive is a bit too strong in that sort of (inaudible). Like on the drilling rig, for example, which is a rather generic type of structure, we found that at least 80 percent of the safety critical elements are already covered by the standards. And to use that effectively is also to make an effective project. Another thing is that the Norwegian system for risk analysis now and the safety cases or the system in U.K. in principle are quite the same system. They have different names of things and a bit different procedures, but basically the philosophy is very much identical. And we have seen that kind of approach is now also spreading. We heard it is used in New Zealand, a couple in Australia, a big discussion in Canada. And the fact is that we have to recognize that not everything can be covered by standards when you have an innovative and a new type of offshore installation and you need that kind of umbrella where you actually catch special hazards not covered by the standards.

So that was on the cultural side. I would then next like to go into some of the offshore experience, because I said there have been, I would say, experience that not all of these projects have been successful. We are talking about considerable overruns cost wise and time wise, and I would like to go into some of the reasons for that. So if you can take the first -- I think we skipped that one. That was just to illustrate this cultural difference between the maritime and the offshore. So the next one. Yeah. So some of the lessons learned we have seen here. It was a machine coming on, I think, or a situation coming on early nineties where it had been very little happening and the suppliers and the oil companies really needed to get going with new projects and they were creating different schemes like NORSTOK and CRINE in the U.K. and the whole thing was to make this



economical. One part of that equation was to make it quick, so tempo became very important. So they went down and saying they should go from 45 months development time to less than 30 months development time, and they wanted to cut the costs by up to 50 percent and they did not achieve that. If you look back, however, they did achieve a lot, but they did not achieve what they said they were going to achieve. So they had very demanding targets, budget, schedule, etcetera. They had also demanding operators with changing requirements on the way under the project. That had also to do with the fact that they had a lot of overlapping engineering and construction. Use of yards, suppliers with limited experience, technology, regulations, etcetera. The yards have had very little to do for a long time and suddenly they were sitting with a number of projects. They had to build up staff. They didn't have people. They had to train people. And at the same time, they represented the concept which was at the best halfway completed with a fixed price contract, and that created a lot of problems.

They had this what they call concurrent engineering and the construction. And typically in that industry for the large project, they talk about having finished at least 70 percent of the engineering before construction prior to that stage. Some of this project -- this was a huge project. Some of them now producing 52,000 barrels of oil. They had less than 30 percent of engineering completed before they started construction. And then having 70 percent left of engineering and having a contract starting production, it's just bound to be problems. At the same time then training people for doing this. A very complex contractual interface, cultural relationship, as I mentioned. For example, the splitting of (inaudible) in one place and then the outfitting in another place requires very special hand-over procedures which was not handled who was actually responsible, what was the delivery project by one, the yard. And at the top of that, the yard I would say the penalties for the yards could never match the loss of the oil companies for delays. So I guess the yards were in a strong position whether or not to deliver these units and a lot of it had to be done either receiving the outfitting or yard during the process.

So the whole areas around the contractual requirements were very difficult. And also a lot of information from the first yard were never handed over properly. So the yard taking it over and starting with the processing equipment they have to basically (inaudible). Then also insufficient attention by management of uncertainties. And that goes all the way from where it was built. Did those yards being able to do it? Did they have the manpower? What happened if they got another contract and had to split? What happened if the ship building came back and the yard started to switch to the ship building? There was a lot of things which made problems in that period. And also I think it's quite common to do a risk assessment to qualify a project to start, but to really do project risk management during the projects was not common in these projects. So quite critical elements for delivery and, for example, were not identified as such in many cases before they really became a bottleneck.

So what needs more focus for these particularly large project is the planning phase. Not so much overlapping. Plan properly and identify technical and project risk elements in an early phase. I think that the oil industry thought about the productivity of the shipyard and said, hey, we want to have that productivity. So they go to the yard and give very favorable prices, but later on the project turned in to be something different from the ship, which was part of that problem. So have more detailed specifications and also a total verification plan, including also class as part of that. I have to put that in here, of course.



But this project, I think in the afterwards there have been a number of conferences about why these things went wrong and it had to do with, I would say, natural things like a project execution, project planning, etcetera, etcetera, and not for the concept set out. Of course, they have another lesson about things which haven't working properly, but they are technical things which you can learn and improve (inaudible). So these are some of the lessons learned. And just the final overhead because we have some time, about of course the Gulf is different. It will take these large projects, at least different from the North Sea.

We have talked a lot about fatigue. We have talked about harsh environment in the North Sea. I think I just mentioned additional issues for the Gulf. You have hurricanes, manning during hurricane and environmental pollution (inaudible). That's what part of the study is now. So I just wanted to spend that much time because I think that the concept itself have probably become a discredit maybe for not the right reason, that there's nothing wrong with the concept. So thank you.

(Applause.)

MR. CAMPBELL: Okay. Thank you. And thank you, Mr. Chairman, and ladies and gentlemen. It's a great pleasure for Lloyd's Register to be here in Houston and to participate in this workshop. Just to focus a little bit on the matters or the issues at hand, the terms of reference that Phil Wilbourn has given us, and I'm going to try and speak to those, relate to the policy issues; and my presentation here has been based upon the findings and the discussions that have gone on today, so they've very much been developed specifically in that context. And I thank DNV kindly for the marketing information which related to the relative market positions for new construction FPSO projects.

If I could start just very briefly. We are a panel and it's described as certification agencies and I think we just need to be careful what do we mean by that, and just a brief definition. That certification role is effectively limited to checking of compliance with regulations. That's what that means. Now, we're talking about two specific types of categories of regulations, one being the coastal state regulations, whether it's MMS or HSE or NPD; and the second are the context of FPSOs flag administration, (inaudible) organization and compliance checking. Now, as we all know and from this morning's session, some regulations are better than others in doing the job they're intended for and therefore they need to be under constant review to make sure that they continue to do that. Indeed, some regulations are perceived by our client organizations not to be in their best business interest and that they conflict with some of the underlying return on investment requirements. The problem for class societies where we're acting as a regulator or a certifying authority is that we can sometimes be tied with the rush associated with unpopular or unworkable regulation. In such cases, the certifying authority is seen to act as a policeman of the state and that is not popular with our client organizations whether they happen to be contractors, builders, owners and operators.

So that is the basic background to that and this is why Lloyd's Register is very pleased to be associated with this workshop and with the process of setting the regulator referendum for FPSOs here in the Gulf of Mexico.



Secondly, I'd like to draw a brief comparison from this morning with development of regulatory policy in the U.K. and just very briefly to recap on that, that certification scheme evolved over the course from the realization that from accidents in the late sixties that regulations would help the process of managing safety. And through the course of the next 20 years, the certification scheme was brought into force and ran relatively successfully until clearly the results of the Cullen inquiry in 1988 following PIPER ALPHA. And I won't go into that and the HSE and the U.K. did cover that ground this morning. But the important point for certifying authorities is that that created a significant change in relation to how do we go about our business. There were significant fundamental changes brought about by that. One, of course, was the cancellation of the role of certifying authorities which from our perspective clearly was a pretty serious business issue. And the fundamental point was for the responsibility and accountability for all of offshore safety to be put in the hands of those who were really responsible for achieving it and maintaining it; that is, the owners and operators.

The safety case that was brought into force in 1990 and subsequently the verification requirements which were brought in to support it called upon the duty holder or owner and operator, rather, to engage an independent competent person for the purpose of ensuring that that which is identifying the safety critical will be suitable when put into service and remain so throughout its field life. And the key point about that is that that was intended to form a key element within the owner and operator's safety management system.

Now, the effect of that was actually an overnight shift in the role of bodies such as Lloyd's Register whereas previously we were acting as an agent of the state and overnight the regulations shifted and required the owner and operator as duty holder to engage those persons; and therefore, Lloyd's Register, whether they acted as such, were assisting their clients to provide in achieving compliance with regulations. A much happier business prospect for an organization and others doing it. The next issue -- customer -- yeah, one of the other key differences just briefly in the context of regulator refrain work, in the U.K. and all seas, is that the independent contact person is responsible to address the suitability of all safety systems and structures. Here in the Gulf of Mexico, the U.S. Shelf, the CVA role is limited to substructure and in the context only of new build and installation, no periodic or in-service considerations. And I've heard it said a number of times, well, that's all we need, that's all the industry wants and that's all that any independent person can provide. But I would say to you that clearly the industry is moving into deep water, to complex technology. There are many significant safety issues, risk issues, which have never needed to be addressed yet in the Gulf of Mexico.

And now I would like to go on and look at the fundamental difference briefly between what is a certification role and a class society role and discuss what the certifying authorities do. And fundamentally there's a clear difference with the role for a class society, and the certification bodies that are sitting round on the panel here are and do act in both capacities. Where they're acting as class society they are offering to a market their own rules which are their industry standard and they're offering those in the context in providing solutions for safety and integrity and for the design, build and the operational service life for an installation. The key difference there is that it's providing a lifetime care system and a lot of exception and development goes into development of that classification rule.



In the context of FPSOs, globally there are many territorial waters where there are no specific national authority regulations and those national authorities rely heavily on the value that is derived from the classification approach and the INO convention work for the management of safety. So where do roles of certification and class blend and what can the class societies bring to the table? That's fundamental if we're to remain in business and part of the future of the Gulf of Mexico FPSOs.

I've mentioned what the class mission is and how that's achieved and what I'd like to do is explain where the classification fits in the context of FPSOs and FPSO regulations. Presently, class rules provide the industry standard in relation to hull structures, hull watertight integrity, essential marine systems and safety controls for the essential parts to keep the floatability of the unit and the mooring systems.

Now, I'd just like to quickly draw again a parallel with the U.K. safety case regulations supported by verification. The regulatory framework allows the duty holder to take maximum credit for any other work voluntarily undertaken and in the process of complying with the regulations, and specifically that includes classification. In other words, there is no need to duplicate the work which has been done associated with achieving classification to address the hazards. The issue is to ensure that the work done within classification addresses all of the relevant hazards and management of those hazards in the process. And one of the problems the class societies have had, including Lloyd's Register, is that much of our work has historically been done behind closed doors and internally, in accordance with private and internal work procedures, and it doesn't -- it hasn't been exposed to the light of day for our client organizations to see what value and processes are going on there and that is one of our failings in the past. So one of the challenges here for us on FPSOs is to demonstrate how the relatively prescriptive technical standards can be seen to address all of the relevant performance requirements of FPSOs. And Carl from the DNV pointed out that in his estimation, 80 percent of that which is identified safety critical are, in fact, issues which are very clearly identified within existing classification technical standards. So it's not a case of needing to reinvent the wheel. It's a case of making sure that wheel fits.

Now, one of the ways in which a class society can move its position and to ensure that it is aligned with a national authority requirement for verification of safety case is to have within its classification process a risk-based option. And this is something that Lloyd's Register has been working on over the course of the last three years and a year ago published provisions within our FPSOs rules which specifically allow owners and operators to take advantage of using a risk-based approach either to individual elements of the facility, structure or systems, or to apply it across the entire facility. Now, that realistically hasn't happened in the context of the entire facility and specifically the reason is that many of the performance requirements are already adequately addressed and industry hasn't felt it's worth investing in doing a risk-based approach on all of the elements.

One of the key drivers of including the option of a risk-based approach other than for us to stay in business, of course, is to specifically meet our client's business need requirements, and that's in the context of commercial business performance, environmental business and safety. And this is achieved by the owner and operator and by the implementation of their safety management and environmental management systems. And



therefore, the important point for class societies is to be providing a key element of those systems.

Now, I'd like to touch briefly on the risk-based approach and where can it provide the most benefit, because I recognize that it is not a panacea for all. It can cost money if it is misdirected. So we need to start by looking at all industry codes and standards that are available to us at the moment. And specifically, if you look at starting with on the left-hand side of the equation, the vessel hull and marine systems, there are very adequate historical and critical data embodied within the technical data for hull structures, marine systems and moorings. And at the IMO conventions clearly are as much investment made in keeping them up to date in relation to SOLAS, fire safety and stability. And then on the right-hand side of the equation we have all of the topsides facilities and all of them configured to well-established petroleum industry codes and standards, ASME and API. So what we need to do in the context of the risk approach is to say what are the gaps in the issues between marine and offshore, and how best can we fill those for this approach? And if you look at the marine side, what we see is that the IMO SOLAS provisions were never intended for FPSO-type installations; therefore, there are significant gaps in their handling of issues in relation to, for example, fire or a blast of overpressure protection requirements and in relation to the processing plant. Also, the ventilation requirements or gas suppression requirements resulting from fluid transfer systems or turrets or from the topsides process. Also, the proximity of the accommodation of quarters to the process or indeed the location of the process to the storage facility of the FPSO.

So those are the weaknesses in the context of the marine side. And then we look at the petrochemical side. Those standards are maintained specifically for the integrity of systems and points. Where they're not so strong is in how they are applied and the interaction between the topsides process and a floating unit.

So these are the areas where the risk approach can provide its best value. And some other experiences are that this is where the approach specifically yields benefit. This is not a technical session, so I won't go into the details of that, but specifically, just briefly in the context of cowl pump rooms which are treated as dangerous spaces in the marine environment can be considered as IP 15 zone 1, spaces which has got significant cost implications for selected equipment in those spaces. And DNV mentioned the conflict between marine and the offshore culture and we have experienced this in many of the projects we've been involved in also. I think as an observation, I would say that the biggest conflict, in fact, has arisen as a result of the contracting strategies and the lack of definition of scope of work and where the interfaces are between the different codes and standards, whether it's on the marine side or offshore side, and that that is what has caused a lot of difficulties rather than the fundamental problem of this is marine or this is offshore. I'm running a little bit short of time, so I'll cut to my conclusions and summary. Lloyd's Register would very much like to encourage the regulator in a number of ways. We'd like to encourage you to look at how you might be able to remove the need for a complicated Memorandum of Understanding that exists specifically because you have multiple regulators involved in offshore safety. It's a sobering thought that if you look back in 1988, PIPER ALPHA was fully compliant with the regulations that were in force at that time and that includes the compliance with the number of regulating agencies that had jurisdiction, including Lloyd's Register. None of that prevented the incident or the escalation of the



incident that resulted in all of the fatalities, and I think that's a sobering thought to bear in mind. We would encourage the regulators to support the provision of an independent insurance process and extend the role of CVAs. And clearly that's a shameless sales pitch on Lloyd's Register's behalf and on behalf of my colleagues, but clearly we've got to demonstrate how that can provide a value and a service and that's part of our challenge. We foresee that -- we would encourage the regulators to contemplate stepping back from the hands-on approach to compliance checking and to take on an audit role of the owner and operator's safety management and environmental management systems. Those systems (inaudible) would be amended to include specifically for the role of an independently competent person with core expertise in the area they were verifying.

I think that concludes my observations and thank you very much for your time and thank you very much. I'd be happy to take any questions.

(Applause.)

