

Panel No. 5: What type of training and certification should be required for key industry personnel?

Moderator: *Mark Rubin, Executive Director, Society of Petroleum Engineers*

Panelists:

- *Donald C. Winter, National Academy of Engineers*
- *Mark Denkowski, International Association of Drilling Contractors*
- *Ken Dupal, Well Delivery Manager, Shell International Exploration and Production*
- *J. Ford Brett, Petroskills*
- *Joe Savoy, Wild Well Control*

Prior to joining S.P.E., [Mark Rubin](#) served as the general manager for American Petroleum Institute. Mark has a bachelor's degree in petroleum engineering from Texas A & M. and a MBA from Southern Methodist University.

Thank you to everybody who stayed around for the last man -- Panel Number Five. We are the last on the list but the subject is incredibly important. We can have all the equipment and monitoring systems in the world, but we have got to have good, well trained people in order to use the systems that we have created. We have five speakers; kind of a diverse set of speakers and the order we are going to go in is we are going to have Dr. Winter first, then Mark, Joe, and Ken. After that we'll open it up to questions of anybody.

So first let me introduce [Dr. Donald Winter](#). Dr. Winter is the Professor of Engineering Practice at the University of Michigan. He served as a 74th Secretary of the Navy from January, 2006 through March, 2009. Before that he held multiple positions in the aerospace and defense industry as a systems engineer, program manager, and corporate executive. Dr. Winter received his doctorate in physics from the University of Michigan when he was elected a member of the National Academy of Engineering in 2002. He chaired the National Academy of Engineering (NAE) committee responsible for investigating the Deepwater Horizon incident for the Secretary of the Interior.

- *Donald C. Winter, National Academy of Engineers*

Thank you very much. Good afternoon. I will forego the use of PowerPoint this afternoon if that's OK with everybody. As you perhaps heard I am a systems engineer not a view graph engineer.

I do want to start out the presentation with a few comments about the committee that we established within the National Academy of Engineering, National Research

Council, to support the Department of the Interior. In terms of the investigation of the causes of the Deepwater Horizon incident.

In particular I'd like to note that we had 15 members on the committee with a very broad spectrum of backgrounds and expertise that span pretty much everything from geophysics and petroleum engineering to safety systems and organizational behavior. The objective of that structure, that staffing, if you will, was to try to ensure that we had the wherewithal and expertise necessary to be able to identify not only the direct causes of the loss of well control, but also be able to deal with the contributing and systemic factors as well. The committee concluded its work late last year. The final report has been published. If you haven't seen it, this is what it looks like. You can get copies of this from the National Academy of Engineering. Oh, by the way, if you want to save a few bucks, can you go on the website and download a PDF copy for free. It's a good deal.

Earlier today you heard from Roger McCarthy regarding the committees' assessment of the BOP design and there's quite a bit more than Roger was able to address within the limited time that he had, and you can find the additional comments in the final report.

My comments this afternoon are going to focus on the committee's assessment of training shortfalls as evidenced by the response of personnel onboard the Deepwater Horizon. Much of this is documented in Chapter Four of the final report, and I will note that we took a very broad perspective in taking a look at the problem -- in particular examining the preparedness for emergency response at sea, not just the issues of well control. I will also note that our findings and recommendations were influenced, if you will, by the Navy backgrounds represented on the panel which included not only myself but Admirals Eccles and Giambastiani. I'll go through a very brief recap of some of the principal findings and recommendations and try to put them in perspective.

Perhaps the principal finding that we had with regard to the adequacy or inadequacy of training is noted as 4.3 and I'll just read the so-called finding here. It says that alarming indication systems, procedures, and training were insufficient to ensure timely and effective actions to prevent the explosions or respond to saving the rig. I'll say a little more later on relative to the issues associated with timely response.

The report goes on and the committee identified a number of what are termed "sub findings" to substantiate this principal finding. I'll just identify a few of those. We noted that the crew was ill prepared for the scale of the disaster. We assessed that the watch officers were not adequately trained. We noted that the emergency procedures were inadequate to minimize damage and loss of life. We noted limited crew participation in training and exercises, limited realism in training scenarios, and a lack of

cross rate training. Now, as I noted before, a lot of the perspective here, including some of the wordings, represent a Navy perspective, and that perspective has been significantly influenced by events such as the tragedy that occurred on the U.S.S. Forrestal in 1967 off the coast of Vietnam. At that time, Forrestal was an aircraft carrier. One of the aircraft on the flight deck of the Forrestal inadvertently released a rocket before it took off. That rocket penetrated another aircraft. Fuel was spilled on the deck and was ignited by the rocket exhaust and the net was a major conflagration which led to a loss of life of 137 sailors. One of the most significant tragedies of that time. It really did cause the Navy to re-examine its preparation for major emergencies at sea, and led to decision that all sailors needed to be trained at least to a basic level in such matters as damage control, medical assistance, and evacuations.

Fundamentally, major emergencies affect all on board and they require the assistance of all on board to mitigate the damage and to be able to save both lives and the vessel. One of the things that have come out of multiple examinations over many years is the importance of timely response. We found many examples that getting water on a fire quickly in many cases is even more important than exactly how you get the water on there. Getting emergency medical assistance to an individual is often more important than getting a high degree of medical knowledge to the scene. Getting the very quick responses is absolutely critical. And the only way you can do that is to ensure that the totality of the crew has basic training and not simply to rely on specialists.

Now the training starts at boot camp, Great Lakes Training Center. The graduation exercise for Great Lakes nowadays is something called Battle Stations 21. I don't know if any of you have seen it or have seen the show that was done by CNN on the events there, but it basically is an emulation of the tragedy on board the U.S.S. Cole. The sailors go on to a near real-sized ship that has the ability to simulate much of what transpired that evening. By the way the tragedy typically starts at about 0500 in the morning to make sure that everybody is afforded the full sense of realism. It is a truly realistic simulation which includes explosions, gas-fed fires, compartment flooding, serious injuries with dummies that are fixed up to simulate the serious injuries, including bleeding and moaning and groaning. The training they receive in boot camp is all tested on that one occasion and it provides them with an experience they can carry through to subsequent school houses and to activities onboard ship.

I'll also note by the way that perhaps a similar assessment might be worthwhile in the cruise ship industry in particular after we have seen the Costa Concordia evidence--many of the same problems that were identified 100 years ago in the evaluation of the Titanic loss.

Recommendations. We had a series of recommendations that are all again included in our final report. I won't go through all of them here, but just try to highlight a few of the major aspects that came out of the committee relative to Deepwater Horizon, all be it with the backgrounds I noted.

We identified the need for realistic and effective training, formal qualifications with periodic re-examinations. We identified the need for major drills at sea, the need to have all personnel qualified on damage control and personnel evacuations, and the need to re-examine qualification requirements for key positions such as the OIM. We also addressed issues of certification, including the need for senior corporate officials to act as certification authority, the use of existing safety programs as models for such certifications. Perhaps not surprisingly we suggested the SUBSAFE program as perhaps one viable model. And we also recommended use of annual reviews by an independent and competent authority.

Now in closing I will note that we have seen how properly implemented safety systems can significantly influence the safety of a very dangerous industry. After the loss of the submarine USS Thresher almost 50 years ago, the Navy implemented what is now known as the SUBSAFE program. I will also note that that implementation took less than one year after the loss of the Thresher. Since the time it was implemented, no U.S. Navy submarine has been lost, no U.S. Navy SUBSAFE certified submarine has been lost in the 50 years since then. In the 50 years prior to Thresher, as a point of comparison, we lost on average one submarine every three years due to noncombat related causes. That change in safety is arguably the direct result of the implementation of the SUBSAFE program. This industry can do the same. I look forward to the opportunity to answer any questions that you may have. [applause]

Moderator

Thank you. Mark is the Vice President of Accreditation and Certification for the International Association of Contractors. He has over 30 years of industry experience having worked offshore in Southeast Asia, the Middle East, and West Africa. His career also includes training and H.R. positions. At Frontier, he was a member of the IADC training committee and assurance panel. He has a degree from Penn State University.

- *Mark Denkowski, International Association of Drilling Contractors*

Good afternoon. I want to thank you for the opportunity to present to you today. Unfortunately, I do have a PowerPoint. My name is up there. Last week, IADC hosted a very successful conference. One of the presenters had a slide called "challenges and opportunities." There were various pieces of equipment. In the middle of the slide were people and training. I would contend you should move that up to the top of the list because the biggest challenge I think we have is finding qualified people, training them

to be prepared for the first day of work, being prepared for promotions, being prepared to supervise once they have been promoted, and being prepared to work in teams. If we do that correctly, that is our greatest opportunity to improve our industry overall as a whole, improve our people. We have to prepare our people correctly.

One of the components of that is well cap retraining. It was born out of the request to create a forum where all segments of the industry can talk and come up with a standard deck can be applied worldwide. Back in 1995, that project started with a work group is essentially which eventually became the Well Control Committee and the various subcommittees for curriculums and other issues. Over the next several years the program was built and implemented and brought out world wide. In 2002, the OC officially endorsed well control training. Today, we have over 158 training providers that we accredit worldwide and the numbers are growing.

The program is based on having a structural quality. It is all about doing it the right way and consistently doing it the right way. We look very heavily at standard course content standardization. Our curriculums are pretty rigid and people must comply with those when they design their courses. We look very carefully at how people deliver the course, the materials that they use, and everything is vetted through technical experts. We also spent a lot of time vetting all of the instructors, making sure they are not only qualified, but that they continue their education, that they continue to be recertified, by attending, not the schools they teach at, but well control at other schools, they see how other schools making sure the instructors are the best and strongest in the industry.

We are very concerned about doing assessments. We are currently doing a lot of work to try to improve them. The last component is making sure the administration of those programs and the quality assurance of those schools is as good as it can be. The programs has not been dormant since 1995, just a couple of line items of major things that have been. 1997, curriculums were developed. 2002, subsea guidelines were introduced. Also in 2002, the original curriculum was revised. I can go down this long list of things that have been done. 51 bulletins have been issued to improve the program. It is a constant work in progress, and our committees are very dedicated and work very hard to keep this as current as possible. We are also ISO certified. We should be audited ourselves.

The courses that are offered are drilling curriculum, tubing course, snubbing, wire overbalance. There are four different levels: introductory, fundamental, supervisory, and well cap plus. Well cap plus is one of the newer accreditations that we offer. It is a supervisor level training course. People break up in teams. It is meant to substitute every other cycle of accreditation. The idea is students break up into teams and solve real-life scenarios on paper. They get to practice and decide how they would handle a

controlled situation and then compare it to the real event and at the end of the day learn if they do it right or wrong and how best to do it. It is a great way to learn.

We also had stacked qualifications. The subsea component for the well servicing side is under development. The recommended levels for this is always a mode of contention but we recommend the introductory level before derrick hands, system drillers, supervisors, superintendent, drilling foreman, and the well cap plus should be for your most senior staff, operating personnel, and everyone involved in well control. Looking forward, as I said, well cap is always something that is in development and is always being reviewed for the best way.

Recently, we organized a new advisory panel that is going to look at curriculum structure and content -- looking at learning objectives. You can put up PowerPoint's but it is much more powerful if you turn it into learning. We are doing a lot of work to make sure there is learning and potential and a lot of the issues with well control training is retention especially with the cycle of every other year sitting through the course. We will be looking at frequency. Is two years the right frequency? Should people or certain disciplines do some training every time they hit the rig? We are looking at these aspects. About 10 years ago, there were a dozen positions requiring minimum basic competencies. Again, at the request of our members, and regulatory bodies, we started a new project to rewrite these competencies for all positions and beyond. This is critical for the work that the advisory panel is doing. These will tie right back into the well capped training. We will be starting with positions that do have well control responsibilities and our aim is to build a global set of minimum 'consequent competencies' that people can measure themselves against. It is the guideline of how to get there. We are also looking at other things such as certifications for different positions on the rig such as subsea engineers and other issues that are members are bringing forward. That is the quick, down and dirty about it. I look forward to any questions at the end of the presentation. [applause]

Moderator:

Thank you. Our third speaker is Ford Brett. Ford is the managing director Petroskills, the world's largest petroleum training organization. Prior to joining Petroskills, Ford worked for Amoco on drilling projects in the Bering Sea, north slope of Alaska, the Gulf of Mexico, and offshore Trinidad and Wyoming. Ford has been granted over 30 U.S. and international patents and authored or co-authored over 30 technical publications. He has served on the board of directors of the Society of Petroleum Engineers and in 2010 served on the U.S. Department of Interior Macondo 30-day panel. He holds a BS in Mechanical Engineering and Physics from Duke University, an MSE from Stanford University, and an MBA from Oklahoma State University.

- *J. Ford Brett, Petroskills*

Thank you. I would like to thank BSEE for the opportunity to present. I am going to give you two answers to the question of what type of training and certification is required for key industry personnel? The short answer, the 90-second answer, and then I am going to try to do a nine-minute answer. I don't know that anyone would be interested, but actually you could have a nine-day answer or a nine-month answer to that question. But we'll just see how the nine minute and nine second attempt goes.

What type of training and certification would be required for key industry personnel? The short answer is the training to develop the roles and specific skills necessary for full-cycle well integrity and crew resource management. Well integrity should extend beyond kick control to include process safety management or case cementing operations, and crew resource management. That's the physics, if you want to call it, or the engineering of what is required to have wells be safe. Crew resource management is important because it turns out that drilling a well is a team sport and it is not just about what I know, it is about what I know and what other people know and how we work together to do that, and so, that's necessary.

I'll tell you some good news about this, at least, I think. It's important to me,; you're asking me this question. I think what is needed to note here is known. So it's not a matter of "we don't know," it is known, so it is a matter of doing it.

Secondly, certification that I am going to describe here can be done and in some cases is being done. Probably have some opportunities to improve how this works, but we need the operator to have assured competency. I think it is important that the operator is responsible for assuring competency. There are different types and levels of competency that I'm going to talk about.

I think that was less than a 90-second answer to the question. Coming into the nine-minute answer; first you got to ask yourself, what is certification? I looked to the regulations and could not find a good answer. Black's Law Dictionary, what is this? Certify means to authenticate or vouch for the thing in writing, to attest as being true as represented, written assurance of some official representation that some act has or has not been done or some legal formality complied with. That makes it sound like I got to get it certified. There is not one, my opinion, one certified thing that is going to happen here. We are not going to have one driving test. I passed the test, I'm ready to go. Operating a safe car there are actually operating safe cars beyond passing the written test. You have to do it, you have to show somebody you can do it, and if you're talking about a safe car, there is a lot that goes into it, you know, you have to have air in your tires, , there's the brakes. So my observation is there is not going to be one test to assure competency.

Well cap has a role and is important and is a key fundamental thing that we need to do and continuously need to do and improved on and perhaps expanded. But If you talk about learning theory, coming back to this training thing, when you say you have to certify things, there are two kinds of things you can say, test somebody. They call it Cognitive and effective. Cognitive is – do you know this? We'll take a test, we'll sit them down and take a test. The effective is if you can actually do it or observe it and of course, pilot training is an example of this where of course, you can pass a test but when you're flying a plane it's a completely different deal.

In our business, there are things that are not unique, that are common, the elements in well cap are components of that, for example. There are things that are unique, like what the BOP configuration on my rig and extends beyond Blowout Preventers to all the other things required to keep a well safe. Similarly, when you talk about unique effective things, like "we've got to execute this well's contingency plan" which is a bit different than, "how would I circulate a kick-on theory and demonstrate that on a test." And so the point about this is, the certification is going to be required, in my opinion, at different levels and across different dimensions. The certification that is going to occur will not be one body but a network of certifications as necessary.

And so a kind of simplified process of this is determining competencies, specifying the job performance standards, task addition standards, observing activities, what is required to do the work, provides learning methods and resources, evaluating the performance, and you may need to go back and re-specify the job standards and provide learning resources depending upon how the performance actually occurs and have some sort of record of achievement.

So when you ask the question what kind of training and certification is required, you need to ask -- training and certification is a means, and it's a means to achieve the performance so we have to understand what the performance is, the learning required to develop that performance, and then a process that describes it in this way and it is relatively simple but it turns out it has to be pretty detailed. And the thing about it is there is not one competency, there is a multitude of competencies required. And, by the way, to make matters even worse, this idea of achieving training and assessment or certification as a means to this is also dynamic in the sense that operations are changing, you know, what's required on shore is different than what's required offshore. If I move offshore, I've been certified on shore, am I certified offshore? Well, it depends on the job role, perhaps, -- as I move through jobs, as I become prepared for my next promotion, though I'm currently prepared, what do I need to do to get prepared ahead, it is a living kind of thing that is going to be required where were continuously talking about the job competencies for this particular job, what is my individual ability to do what I need to do and what is the group's ability to do that and continuously close those gaps.

So, again, something like this is relatively easy to describe and works pretty well, but doing it requires a detailed plan and process to achieve it. So, an example of how this is done and can be done is, first of all, addressing the cognitive component by specifically describing what somebody needs to know to do a specific task. There could be many, many, many of these tasks. Create the learning for that person to develop that knowledge. It can be a self-study, a training course, and then some sort of knowledge assessment where this person actually knows what they need to know, and there might be a time out kind of thing on this where in fact they need to continuously reassess. Then you need to have somebody observe you doing it in a simulation or in reality, so that you can actually have someone say I know that they know what they need to know and I can certify that they can really do it, so there will be a record of competency achievement for one specific task, a task condition standard for one specific element and then it continuously moves on and improves.

There is a well-known physics to developing these appropriate training and certification required to accomplish specific tasks, it's related to the process, it's related to organization, and a little bit like Gary talked about in the last panel, where you can say "You want a BOP to work," well you better have the rams work, that means the valves better work, and you better make sure all of these different trees work out. Similarly, can say you want to have someone know how to maintain a BOP? Well, they better know this, kind of break down that structure. The point is, it's a detailed thing. But it's not an intractable, "what are we going to do" kind of thing. It can be done. So you have specific resources, or content, that describe what's required to describe a specific set of activities, appropriate knowledge assessments and practical on the job capability sign offs that someone has the capability of doing these.

So you say what kind of training is required? Well, it turns out there's lots of training for lots of little things, depending on where you are and there's lots of different assessments that are required and actually observations of someone doing a specific task. While it's not complex, or intractable, it's already known, it turns out it is a relatively detailed task because there are a lot of little things involved in our business. So, if you do that -- by the way, this is an example of one system -- there are numerous practical different systems and processes that people use to implement this in reality where you have role and operation -specific competencies that people need to have, skills, What do they need to be able to do, and then training to develop those and assurance methods to be able to identify whether someone actually has that role, operation - specific capability and then time and event-based recertification. Let's check to see if you can do that again. If you can do that, he will be able to have the detailed description of what everybody can do and are they confident to do their job.

Now, there is one important aside here which is a little bit of a novel thing but I think is very interesting. That is, a competency assessment, a test, an observation

about somebody doing something, is information about the capability of that group or person. In other words, it is information about can that person actually close the BOP in time; can that person calculate the proper mud weight, and all of the different things that would be involved? You can use Value of Information techniques to determine the value of that competency assessment. Based on that information, it is based upon things like this. What is the probability that a competent person will fail a test? What is the probability an incompetent person will fail the test? What's the probability a person is competent. You can combine these things together and the defining of this is very often, in fact, very very often, such techniques demonstrate very, very high economic value of assessments.

The point being, that who wants something to go wrong in an operation? Nobody wants it. It costs money and time and is unsafe. It's just bad. This is a way to align economic incentives with actual competency and is a way to demonstrate that actually assessments turn out to be very valuable. If you have a proper assessment, you are actually making money every time you are conducting an assessment.

Anyway, that's my nine-minute answer attempting to try to say what training and certification should be required for key industry personnel. But returning to the short answer, I think we have a challenge. Let me tell you the good news. I don't think there is any big question or hurdle that we need to overcome here in terms of is this possible to do or can we actually do this? When somebody talks about a 30,000 psi stack that is going to be available all the time and self-diagnosing and all these other things, it is kind of like "Hey, that's a challenge." Can we do that? The industry has done phenomenal things in the past decade. I do not doubt that people will meet that. That is a challenge that you might wonder if this can be done. This can actually be done. The challenge is actually doing it and taking the time to describe what is required to do these specific roles properly and then how do we have to be certain that people actually have the skills required to operate in offshore safety. Thank you so much for your time. I would be happy to answer any questions later. [applause]

Moderator:

Thank you. Our next presenter is Joe Savoy. Joe is Regulatory and Well Operations Manager for Wild Well Control for Marine Services. He started his career at Amoco and has worked in a number of engineer and management positions at several companies including time as the Vice President of Operations for the Offshore Energy Development Corporation and Operations Manager for Ameritech Resources. Joe began his current position at Wild Well Control in 2006; he has a BS in Petroleum Engineering from the University of Southwestern Louisiana.

Joe Savoy, Wild Well Control

Thank you. Thank you to BSEE and everyone for staying to listen, I know its late in the afternoon. I want to also mention that the slides were put together by Steve Vorenkamp, our General Manager of Training.

History is repeating itself. There was a recent piece written by Derek Park which illustrated those who can't remember the past are doomed to repeat it. There has been several incidents in the oil industry. The Sea Gem North Sea, the Alexander Kirkland, Ocean Ranger, the Piper Alpha, the Petrobras P36. In all of these, approximately 411 lives have been lost collectively by these accidents. Granted this is offshore and heavily regulated.

So the question comes to mind, are we living with acceptable risk even under these regulations? U.S. domestic land events; this is a listing of those events that go back as far as 1997. Some have lives lost, almost all of them have personnel injured Well control call outs. Wildwell gets five to seven calls a week worldwide. Of the current ones, 70% are land-based. The majority of the wells are drilled in the U.S. are as well. We had 55,000-plus wells drilled this past year in the U.S. -- 2011. Our statistics, one per 1000 will end up being a full blowout. There are over 600,000 production wells that are actively being worked over. Of those, 85% of the blowouts in the last ten years have been due to a lack of fundamental well control, forgetting the basics.

Our challenge is to respond to the need for proper process for assessment and kick identification with inexperienced and experienced crews. Fast drilling, horizontal conditions, and complex fluids mask the changes and downhole dynamics that can be missed or at least misdiagnosed. Land drilling doesn't always face the same requirements from a regulatory basis that offshore drilling does. We need to explore ways to increase the operational well site awareness and good communication to add to safety and efficiency when formal training does not -- is alone not enough. Well site competency drills and assessment drills, rig audits, random testing with gap analysis, incident command codes, drills and DEWOP drills. The visible safety leadership from senior players whether it is operator or contractors in the industry are inconsistent. Workers do not believe it to be a high priority the duty holders claim it to be -- stop actions or shut-ins.

Technical issues that can be solved by design but behavioral issues require a little more attention. Individuals must have confidence and authority to do the right thing within the work environment at the right time -- their job integrity. If we don't empower and support the employees to react properly, we are condemned to future incidents. A well-controlled training, IADC, API, IWCF is generally recertified every two years. Many crews forget what they experienced just six months later. Sometimes less. Internally, we have done audits and testing on our own people at a one-year interval. Most of them flunk the same test that they passed the year before. One effective way to add

importance at the rig site and give confidence is offering well control tuneups, measured kick drills, trainings specific to each responsibility, frequency. Many employees have never even heard about well control and what to even look for until they reach the AD level, so additional awareness is useful and profitable. Insurance companies have supported well control training for many years to reduce their losses. Generally the clients have only one supervisor per site to be compliant.

As a rig manager, the only one who needs awareness offshore is the AD and above. If the hands are well informed, will they do what is needed? If they don't know, then self preservation would definitely take over. Can they really create a stop action? Saying it's so is not the same as practicing it, there is a disconnect. The problems we face together in a rush to field new crews and new rigs on an ever-increasing scale will place hands with little education and illiteracy with the systems that they are operating in multiple languages and expect understanding on engineering and technical-type principles to conflict expectations and training still exist rate to hire rate of consultants with poor skills, a 9 out of 10 mentality. No problem, it's just shale drilling. We have done this before. Work over drilling experiences. Why not incorporate skills and well control awareness where they operate in a practical sense? A non-threatening environment supporting real world practices, job-specific, and well-specific.

Well-side expectations; to give an evaluation of crew effectiveness to react to the potentials of a kick. Judge the skill set per crewmember, re-emphasize knowledge of warning signs, a fair gap analysis to apply necessary improvements for managers, non-judgmental conditions toward crews.

Suggested path forward: Meet and greet with the command and RM tool pusher. Walk through a typical well site tool box safety meeting. Challenge each position about well control responsibilities. Define actions before and during a kick. Execute a kick drill for time and effectiveness with during remediation. Leave and review laminated kill sheets, shut-in procedures, crew responsibilities, written report on effectiveness and additional support and effectiveness per employee. Elements of well site assessment -- train the trainers for incorporation of company's best practices - mentoring. Challenge each employee on his duties before and after a kick is detected, challenge each job position. Why his input critical to the overall operation, challenge each employee on operational equipment and maintenance necessary for containment. Time drills for efficiency. Confirm that the driller completely understands his role for shutting in the well. Challenge supervisors, test critical positions and report gap analysis findings for improvements to act upon and incorporate frequency relative to operations, bi-annual or quarterly if necessary.

Cost verses benefits: low cost -- it's easier to move one assessor from your company out to a rig than four employees. It's much cheaper than day rate loss or

worse. Discounts on BOP insurance are even secondary; employees days is more than a rub and scrub, in team building, he learns efficiency and awareness. It improves client and contractor relationships, and it's compliant with Subpart O and SEMS.

Good tools are still good tools. Using tools that we as an industry have found to be effective, we can eliminate loss of life and property. That's good stewardship. It's a good business tool. So we can, yes we can. We can learn from our past and do it better and hopefully, by design, not be doomed to repeat it. One thing we recommend is drill, drill, drill. Drill your people, drill them in their positions, and drill them often. I would be happy to answer any questions. [applause]

Moderator:

Thank you Joe. Our last speaker is Ken Dupal. Ken works in the position of Well Delivery Manager for Shell International based in Houston. He has 32 years in the industry including 25 years with Shell and over 25 years' experience in deepwater well engineering and supervision for domestic and international projects. His experience includes deepwater exploratory well drilling and execution, deep water field development planning and execution, rig construction and commissioning support construction and technology development and implementation.

- *Ken Dupal, Well Delivery Manager, Shell International Exploration and Production*

Thank you. On behalf of Shell, I would like to thank BSEE and the committee for the opportunity to talk to you. We have heard quite a few topics and good information today so far. A lot of it has been focused around BOPs, well control and well control training. I heard a little bit in Session One this morning of a mention around integrity of operations, or the whole system. I'm going to take a little bit of a broader view in this session and talk about the focus of well integrity overall, because we see that well control and well control training is just one part of ensuring overall well integrity to prevent incidents. And the theme is making wells safer and a systematic approach to wells process safety.

What is process safety? This developed quite a bit on the downstream side as a consequence of a number of incidents in refineries and chemical plants. But simply, process safety means the management of hazards that can give rise to major accidents involving release of potentially dangerous materials, the release of energy - such as fire, explosion, or both.

So how does this apply to wells? If we look at the big triangle to the left, there is an inner triangle which is the traditional personal safety system we're all familiar with, and we have fairly established metrics in a number of areas, things like measuring and monitoring first aid cases, unsafe acts and conditions at the bottom, and escalating to

more severe incidents as it goes toward the top of the triangle, which in a personal safety is a fatality or a multiple fatality case. We are taking a similar approach toward a process safety side that we are tracking similar incidents and, at the bottom, it is things like unsafe conditions. As we move further up the triangle, there are items such as the loss of a single barrier in a well. Where you would normally have two barriers in a well, then the loss of one barrier reduces the overall integrity of the system up through more severe cases of loss of containment of the well, uncontrolled release of substances, and then a major catastrophic event such as a blowout. Then, just as a comment on the presentation before, I thought these statistics were quite sobering in that as an industry, we're still seeing one in every 1000 wells where there is a blowout that is experienced.

What we are trying to achieve is overall more wellbore integrity. This is a systematic approach to the wells' design and execution process to get us there.

We see well control training is one aspect, but there are quite a few pieces to the puzzle to get us where we need to be.

- First is design integrity, and in order to achieve that, we have a series of design standards within the company.
- Second is technical integrity. That allows us to manage the technical risks and construction risks. Examples of that are things like our well control manual HSE case on the rig.
- Then there is operating integrity, where we have an HSE case on the rig and a safety management system of our own and generally in conjunction with the contractors also doing the work.

Overriding all of this is we need to have competent people involved in each of these aspects. That includes not only well control and well control training but competent people for the design and operation of the wells.

I think we have seen an example of a bow tie that was given by DNV in one of the earlier presentations, so we're using a version of a process safety bow tie here. I guess the top event or an incident is shown as a circle in the middle. On the left side, think of it as controls to prevent that event from happening. On the right side are measures for recovery or mitigating the consequences. We focus on both areas. The items include standards for overall well design and overall well control manual, and rig safety cases.

On the personnel side, we have technical competence testing, and I'll show a little more about that in a couple of slides. We have technical authorities and an assurance framework in place and we have a number of what we call principle technical experts in the company to provide support and advice across the board. We do have

tests for testing competency of contractors and various items of equipment and measuring the status of systems.

On the recovery side, or mitigating consequences, standards include requirements for well designs to allow the ability to cap and contain the well in a worst-case scenario. Again, our well control manual. We have an incident response for the blowout containment plan.

On the equipment side, we do have equipment that has been developed both internally and within the industry for things such as spill containment and capping systems.

Some of the examples of standards and processes we have within the company are an overall global wells management system manual. So in some areas, we are legislated by requirements for what we need to do. In other areas, we are not as legislated but we do have overall global requirements for how we manage the entire wells design and execution process. We have a series of engineering manuals, a set of what we call DEMs, we have a system in place for monitoring, tracking, and reviewing what we call process safety incidents, which are in addition to the personal safety systems and statistics that we monitor.

We also have an electronic well control assurance tool. It is similar in some respects to some of the systems that were shown earlier, however it does not include the detailed BOP health check-type monitoring system, but the electronic well control assurance is a database that records compliance of equipment and certificates of conformance for equipment, records certification of personnel, primarily well control certification of required personnel. It also includes records of well control equipment testing, both function testing and BOP pressure testing. There is a barrier verification and assessment recording where we have a barrier plan and then the verification of those barriers is also included in the system. That may include pressure testing of casings, for example, or confirming the amount of cement that was used is the same per plan. And we have a management of change process with respect to wells' activities.

On the training side, we have a couple of different systems. In wells, we have a competency development program. This was started as early as 1973. In Shell's terms it's called Round One and Round Two. It is a multi-year effort to get through the program which includes exams and certifications. On average there is an 80% pass rate of personnel through that system. It has been implemented globally for all Shell well staff and includes both practical and office elements and you can see in the picture it is a fairly substantial paper package of binders to get through.

In order to continue as part of the wells discipline in the group, each engineer must pass the both Round One and Round Two exams and become certified. It has been accredited as the equivalent of a Master of Science degree by two universities in Europe.

We also have other expertise in competency testing. We have what's termed a Round Two diploma for some of the more experienced staff that did not come through the company with a university degree, which is basically a reduced version of the Round 1 and Round Two material. For consultants, that we use for supervision on site, they are required to take a trade test before going out to supervise operations. We have developed our own advanced well control course with our own simulator and that, as of this year, will be mandatory every two years for operations staff. For contractor competency, we require either well cap or international well control.

Quickly, we do use the HSE Case system globally, and have done that for a number of years. You see the bow tie on top and then what is normally called the Swiss cheese model on the bottom. Again, on the left side is prevention and on the right side is recovery. We want to make sure we have strong systems in place basically to reduce the size of the holes, to ensure we have better competence, and to prevent the top event or blowout from occurring.

That whole system is only effective if people understand their roles in the critical activities. HSE Case generally includes a risk assessment matrix which is shown on the bottom and is conducted in conjunction with the drilling contractor normally. So there is an interface of bridging document that's required between ourselves and the respective company and these are consistent with the SEMS requirements that have recently come out.

On the far right side, we have an emergency response system that includes blowout contingency plans, which has two elements. One is relief well contingency plan and secondly is a capping plan. What is shown on the right is a photo of a capping stack. This is actually the MWCC single ram capping stack for Gulf of Mexico. Shell is a member along with a number of other companies; globally we're also participating in the OGP or SWRP effort and then also we have two capping stacks that Shell owns available for global use.

In summary, it's more than just well control and well control training. We have a across the board a systematic approach for well bore integrity that includes design, technical operations, and competency of personnel that is required throughout all phases to ensure we do have adequate well bore integrity. Thanks. [applause]

Moderator:

Thank you, Ken. With that, I would like to open it up for questions for any of the panelists.

Audience:

Question for Ford and a question for Ken. Ford, In your presentation on training, you cited the professional engineering qualifications for the engineering staff and Ken just presented maybe an alternate model whereby there is a certification of the engineers. If you look at professional engineering standards, the one for petroleum engineering is mostly applicable to drilling, but drilling is a minor part of that. It's really dominated by reservoir and the other disciplines of petroleum. When it comes to engineering certifications to address the risks we face in well design and operations, I contend that is not the model we ought to follow and maybe something Ken proposed would be more suited. Your thoughts?

J. Ford Brett, Petroskills

My presentation is confusing if it meant to say "I'm a professional engineer," which by the way I am; means I can do any kind of engineering, or, in my opinion, this is a floor to the competency situation which as a professional engineer means you can solve complicated problems that involve math, which is basically what it certifies. It doesn't certify you know anything about blowout prevention and it doesn't certify that you know anything about what you need to know to do your job.

What wasn't maybe clear enough in my presentation was that these competencies that need to be assessed and certified are related to roles- and job-specific -- which this would be an exact example of that kind of thing. The certification for professional engineering will not be sufficient to ensure we have capable people who can engineer these wells. That is one role by the way. There's a subsea engineer, there are dozens of other roles. If it came across as "Oh, all we need to do is get professional engineers and everything is cool," that's not what I meant.

- *Ken Dupal, Well Delivery Manager, Shell International Exploration and Production*

Yeah, Joe. I think you bring up a good point. The PE certification can apply to mechanical engineering civil engineering. There is one for petroleum engineering, as you mentioned, that is quite a bit focused on reservoir engineering, and I think as a company, we've recognized for many years that wells for drilling and completion probably did not exactly fit one of those specific PE tests. I think that's why for years, I think, we have had our own well training course even though they are not certified as PE's, they are at least trained to the equivalent level that we think we need well engineers to be trained for to do well designs, to meet standards.

Audience:

Ricky Cummings here. I'm the co-chair for standard 53, working with Frank. A lot of discussion today as far as training on how to detect a kick before it happens and before we end up having a blowout, but not a lot of discussion, which I think is the right way to go and very important. But equally important is on the maintenance – who's maintaining the BOP and who is doing maintenance on it? OEM has but out torque values, they've put out proper lubricants, I think these guys need to be trained to understand those reasons, why they are putting them on there? Mostly it's roughnecks, roustabouts moving up to a subsea engineer position and no accreditation or course or training in hydraulics or electronic that these systems use. I address this specifically to Mark, because you did mention briefly about subsea training and accreditation. But is anyone aware of any industry movement toward certifying these guys that are working on the BOPs?

- *Mark Denkowski, International Association of Drilling Contractors*

Well cap in general doesn't address the technical side of training but I think in general, it has to be from the time the well is planned to the time you P & A (Plug and Abandon) the well. Well control shouldn't imply "What do you do when things go south on you?" You should be planning the well so that it is a non-event, start to finish. I'm not aware of any programs now other than the manufacturers who are providing that training. I don't know if you would call them certificate level, but they do have training that rig-based people could be sent to currently, they could be sent to learn the equipment and how to properly maintain it and lubricate it so that it is always available. I know the major contractors do utilize that service extensively, especially offshore. People who work offshore send people to the manufacturers for that sort of training. What we're hoping to do moving forward is to build some sort of a certificate program that goes into more depth about the day-to-day operations of the BOP, but it's a work in progress.

- *Ken Dupal, Well Delivery Manager, Shell International Exploration and Production*

I am not aware yet of any formal certification required for someone to be titled as a subsea engineer. I believe it is a contractor-specific level to determine that and where they are for ensuring those people are confident -- are confident to do the initial review of the BOP system and any subsequent maintenance. I would open that up to one of the drilling contractors in the room to see if they have an opinion on that.

- *Mark Denkowski, International Association of Drilling Contractors*

It is common practice nowadays to have the subsea engineers live with sub-BOP from the entire time it's being built by the manufacturer. Typically, they know that piece of equipment inside out and it's a very common practice. But I agree there is no defined certificate program at this time.

Audience:

Darrel Brewster with PetrofacTraining. Mark, you and set on the IADC when we were putting; we've talked about the skills and knowledge, ability and competency framework that was being built and obviously here in the states we need to do a better job understanding that training doesn't equal competence. So my question is around the integrity of any competence assurance system is going to be around its assessor. So how do we qualify people (Subject Matter Experts) to assess or even certify these assessors when behavior analysis shows us that what we can't do is allow a supervisor or peer to go out and do that assessment because we would rather coach them than actually follow the standard? So there are legal implications for all of us, right. If I sign an individual off as being competent, or not yet not competent, I have to measure it against that standard, whatever it might be. So as Ken was talking about, from a process safety standpoint, we start thinking about how we are going to assess people on the well, understanding the integrity of the well, the barriers, the controls, and all these types of things so we have to have independent assessments there. So I guess the question is more about what we are going to do to insure the independence of an assessment to deem somebody competent or not competent; how do we even qualify these people through an internal system, like Shell's for example, or an external certifications out there?

- *Mark Denkowski, International Association of Drilling Contractors*

Any competency assessment program, no matter how well it's written, is only as good as the assessor himself. Typically those assessors are the supervisors on the rigs. I have been involved in writing a very successful competency program, but it was successful only because we took the effort to get out in front of every single employee one on one, to teach them leadership, mentoring, assessing, and to teach them the importance of the decisions they make in that assessment process. They do not pass a guy through because he's their cousin. What's the impact of that guy negatively and positively? There is a negative impact also.

It's another thing we're seriously talking about -- trying to create a formalized assessment training program that we can roll out and help companies with. I think there's quite a few out there who do this, they go to great lengths to coach their assessors and it comes down to the culture on the rigs and companies in general. If people truly believe what they're doing is right, they'll do the right thing rather than take a shortcut by improperly assess people and pushing them through to promotions they're not ready for. If the program is written properly and the people are trained, it will work.

- *J. Ford Brett, Petroskills*

An assessment is like an audit. I have a little company and I like to have external auditors come check on my accountants every now and then to make sure things are going right because you want to make sure there is integrity in the system. If the system is designed properly, if the system is designed properly, though, in the competency condition it is making it so you describe the task, the condition, and the standard necessary to perform that activity, it is clear to what is required and there is a description of the competencies required for the assessor, analogous to the description of what is required to be the CPA to come in and audit my company. And so there is a... it falls back on itself in a sense that there are competencies' required to be assessors and they are tractable, definable things. Not to say that any one of these descriptions will ever be perfect. The competency description will never be perfect and there will be a hole in what the assessors' knowledge is or whatever. A proper system will be self correcting and will continuously maintain gains and will continuously improve as it moves forward.

- *Mark Denkowski, International Association of Drilling Contractors*

At IADC we do have a competency assurance that we offer to companies, and one of the key components we offer is that you have a process for training your assessors and tracking your assessors. That's a key component.

Audience:

I have a question for Don Winter. I won't let you off easy here. You mention SUBSAFE and certainly your knowledge of SUBSAFE and your involvement in the review of Deepwater Horizon -- there are lots of positive things and I have been looking more and more at SUBSAFE. But from your perspective, what would be the challenges applying SUBSAFE of the nuclear Navy is doing to the private world of contract drilling and operations?

- *Donald C. Winter, National Academy of Engineers*

I think the SUBSAFE program has been particularly effective for two reasons: One aspect should be pretty easy to apply and one aspect is going to be difficult. The easy aspect is that SUBSAFE focuses on two fundamental concerns associated with submarine operation. Can a submarine submerge to depth without being crushed? And when it is submerged, can it resurface? That is it.

A lot of other safety issues on board the submarine -- fire, all sorts of electrical problems, things of that nature. They're outside the scope of SUBSAFE. It really focuses on those two core issues, and I think that aspect is applicable to industry and it really is not a problem. Though one aspect the Navy employs which I don't see in the industry is a very strict sense of personal responsibility and accountability. People are

removed all the time. I used to do it. People would say on many occasions that isn't fair for that one individual. There are extenuating circumstances with this issue or that issue. It didn't matter. What we were concerned about was not what was fair for the individual but what is fair for the service, for the Navy.

Establishing the expectation that everyone had to do whatever was needed to operate in the proper manner did more to focus the efforts of individuals. A lot of this has to do with individual focus more than anything else. And so yes, every once in a while, people would say that's not fair and I might even agree there were certain unfair elements. But if it was in the best interest of the Navy that is what you do. I worry whether or not the legal system in the United States, having spent a good bit of time in private industry and having more than my share of wrongful discharge litigation, whether or not it would put up with that type of aspect.

I think it's going to require some very careful drafting of any similar procedures to ensure you can in fact take appropriate action in a timely manner. And ensure the needs of safe operation take principal priority.

Audience:

To that point you were just making, have there been any efforts in this panel questions or initiatives requested for soft skills along with technical skills being trained in the field? Of course the soft skills, speaking from yesterday and today. When my mentors trained me, they trained me to go to work on a piece of equipment when I was on my way to the piece of equipment, I would touch nine or 10 other pieces of equipment and come up with more preventive or corrective maintenance just going out to one PM. Today because of the younger and younger work force -- they're taking that PM right off a printer or away from their supervisor, they go straight to a task and come straight back, and the preemptive action of inspecting our equipment is starting to fade away. I am starting to see this in a lot of different technical aspects within our industry. Of course our company has been asked many times to do assessments, on not just the technical side of any one discipline, but also the soft skills. I just wondering if you guys have had the same experience where you're starting to get requests to change the way people think about the way that they do their job?

- *J. Ford Brett, Petroskills*

This is my experience. People recognize the importance of soft skills, so teamwork is important; communication is important. Emergency response. Personal behavior are important. So it's not that "we don't care about that." My experience, though, in attempting to come up with common competency standards, you can generally get people to come around technical standards and start talking about casing or mud and whatever you're talking about, and get people to agree to that. The issue

we have with soft skills is coming up with a common standard or taxonomy; it's very often that people don't use the same word to describe the same thing. And so in other words, one of the difficulties we are going to have is, we all talk about mud weight, we all weight the same, we all use the same thing, and so we talk it, we've got that one out. When you are talking about what are their roles for the company man, what are they and do we describe them the same way? A small analogy to that, coming back to the personal safety thing on Ken's pyramid, for example, is that people said "Oh we don't use stop cards because we didn't want to license it to DuPont, so we call it something else." You are not able to have people go from one operation to the next if they are not calling things the same.

So the challenge in the soft skills is not that people don't think it is important, but coming up with a common set of standards about what we're going to do and what a rule is called and getting agreement on what is required for proper communication and defining that, and creating standards as compared to you should be able to recognize a kick and calculate the mud weight. So that's my personal experience, we have a bit of difficulty coming up with a common set of approaches for soft skills.

- *Mark Denkowski, International Association of Drilling Contractors*

I think you'll find that most contractors out there, lease and I'm sure the operators as well, I'm sure they have a pretty robust onboarding process and what not to teach all the soft skills. But I agree that there is quite a disconnect between company to company; it is tough to transfer different people between different companies. I think the big goal is to try to find that commonality to be able to transfer people around.

Moderator:

Any other questions? If not, thank you for participating in this panel. [applause]