APRIL 2017 EARLY KICK DETECTION (EKD) TECHNOLOGY SOLUTIONS FORUM QUESTION & ANSWER SESSION

Question 1: The presentation was focused on the 'drilling' phase of a well. Are the other phases important from this perspective as well? Secondly, the presentation focused on well control as an important aspect for high risk systems. Isn't personnel complacency and human incompetence important attributes of high risk systems as well? Lastly, what fractions of 'kicks' studied can be referred to as 'true/full-blown kicks'?

BSEE Response: Yes. The different phases of the life cycle of a well including drilling, completion and production are important from the BAST perspective, not just drilling. BAST is focused on the technical aspects of the system and issues like personnel complacency and human incompetence are out of the scope of BAST. BSEE has programs in place such as SEMS that addresses what BAST does not in regards to personnel competency and human behavior. Regarding what fraction of "kicks" resulted in full-blown kicks was not part of this assessment. However, the BSEE TAP 765 Study final report by Exprosoft (Per Holand) may provide the details of this statistic. This report can be found on the www.bsee.gov website.

Question 2: Depending on what operation is being conducted on the rig, different thresholds may apply for drilling vs. completions vs. tripping vs. pressure testing, etc.

BSEE Response: BSEE agrees that different thresholds may apply to different operational categories in regards to a BAST determination.

Question 3: At any decision points in the BAST flow-chart, is 'No action' an alternative? What are the other alternatives based on? Some of the steps in the BAST flow chart (e.g. steps 1.2 and 1.3) are based on studies conducted by BSEE. Are these studies open to public? If so, where can these be obtained? Wouldn't it be better to send the detailed report at step 1.7 to qualified experts, (rather than wait until stage 2 is completed) so that they can critic the studies conducted and point out any inadequacies/errors in the study? Is there any deadline of public notice/comments that will lead to the next step in the flow chart?

BSEE Response: Yes. 'No action' is an option that can be taken in the BAST process if deemed appropriate. The other alternatives in the BAST process include development of regulations, standards, inspection practices, use of Conditions of Approval in plans and permits, publication of an NTL and initiation of research. A detailed report including any studies completed by BSEE on EKD technologies will be provided to qualified third party personnel at the start of stage 2 (as per the BAST flow chart) and posted on the BSEE BAST website https://www.bsee.gov/BAST. Technology improvement objectives were posted on the BSEE website on Feb 17, 2017 and are open for comment until June 28, 2017. Additional opportunities to submit comments to BSEE on the various steps in the BAST process will be provided to interested parties throughout the process.

Question 4: How is it determined that the technologies that are currently being

implemented fail to satisfy BAST standards?

BSEE Response: The technologies currently used for EKD on the OCS are not in the opinion of the agency robust enough and do not provide enough warning time to personnel in regards to detection of a kick. These technologies (e.g. pit volume indicators/sensors, software) will be evaluated as part of the EKD BAST Determination process either through testing or data analysis.

Question 5: Will the BAST determination process be applicable to all types of facilities? Will compliance needs vary on the type of facilities?

BSEE Response: BSEE has identified weaknesses in systems and procedures being used on the OCS in regards to kick detection. These weaknesses limit these systems from identifying kicks early enough to safeguard against a Loss of Well Control (LOWC). The BAST Determination process applies not so much to the type of facility but rather the type and level of risk associated with the operation being conducted on a facility. For example, an exploratory well drilling in a new field or a delineation well being drilled in a sub-salt, tight margin, and/or HPHT field are typically considered higher risk than a re-drill in a mature field. Different "risk" wells may entail different types of BAST technologies for EKD. At this stage, BSEE has not precluded any drilling, tripping, completion, etc. operation from consideration under this BAST proposal. The report that BSEE will post on our website developed under Step 1.2 of the process provides a better explanation of the agency's selection and rational for operations impacted by this EKD requirement.

Question 6: A detailed analysis of kick events reveals that human elements are the root cause of the majority of these events as opposed to technical failures. Isn't it unfair to not look at the system from a holistic perspective and focus only on the technical aspects through the BAST approach?

BSEE Response: BSEE is aware of the importance of how human elements can impact well control/kick events. As a result the agency has various rules and regulations, such as SEMS, Subpart S already in place to address this concern. BAST deals only with commercially available technical solutions to an identified safety concern. The entire BSEE regulatory program needs to be looked at as a whole to see how the agency addresses various technical and behavioral issues.

Question 7: Isn't it better to reduce the frequency of kicks itself by implementing rotating control devices (RCD) to manage pressure drilling (MPD) rather than focusing on EKD?

BSEE Response: RCD systems for MPD were evaluated by BSEE in the initial assessment the agency conducted on commercially available EKD technologies. However, devices like an RCD and systems like MPD were not included in the actual BAST determination because the agency felt they were outside the scope of the safety concern.

Question 8: Are systems like managed pressure drilling (MPD) being employed?

BSEE Response: Various types of MPD systems have been tested and used on the OCS. BSEE believes that EKD is a component of an MPD system, however, MPD were not thoroughly evaluated as part of this BAST Determination. BSEE continues to support Industry's' use of MPD systems that can provide well control benefits beyond that of EKD alone.

Question 9: It was mentioned that the volume under consideration for kick detection is in barrels. Shouldn't it be in smaller orders of magnitude such as liters? The sensors for EKD will provide accurate and precise information of the volumes released per unit time. How can this information be used to assist human interaction with an objective to mitigate kicks?

BSEE Response: The Technology Improvement Objective (TIO) for EKD is in barrels per seconds. BSEE has been informed that current technologies are capable of measuring kicks with volumes significantly less than a barrel. BSEE is also aware of the human factor issues associated with well control and has many programs in place such as SEMS, Subpart S to address this component of OCS safety. BSEE also requires OCS operators and contractors to complete well control and production safety training in accordance with Subpart O requirements which also addresses the human element of safety.

Question 10: Are there time line expectations associated with the BAST Stages and Process?

BSEE Response: Yes. The three-stage BAST Determination Process is expected to take 2 – 3 years to complete. Please see the EKD Timeline on the BSEE website for further information @ https://www.bsee.gov/BAST

Question 11: On Super bowl Sunday, in Federal Register (FR) 82 and 22, there was an Executive Order (EO) issued on "Reducing Regulations and Controlling Regulatory Cost". It proposes the elimination of two (2) regulations for the promulgation of one (1). "Regulation" by the FR is defined as law, policy, procedure or practice of an agency. How has BAST and the processes apply in light of this? Is "Determination" a "Regulation" as defined in this Federal Register?

BSEE Response: No. The Federal Register EO does not apply to the BAST Determination Process. The BAST process is not a new regulation. BSEE's enforcement of BAST is tied to an existing Directive under the OCS Lands Act Amendment of 1978 and BSEE regulations at 30 CFR 250.107.

Question 12: What level of processing will the raw data be subjected to before the alerts are generated?

BSEE Response: The level of processing is dependent on the type of system being utilized. All systems should incorporate some type of flux indicator, surface logging, and/or geo pressure monitoring.

Question 13: How much of the data interpretation can be automated and how much is dependent on a person looking at the data?

BSEE Response: Automated data interpretation and real-time operator interpretation and management are both important aspects of a successful EKD system and must be performed in combination. The amount of data that can be automated and the amount that will be dependent on a person will be determined by the company employing a particular system.

Question 14: How will contextual data (i.e. transfer of mud between pits) be integrated with the EKD systems to improve reliability of their response?

BSEE Response: Protocols exist for such a situation and it will be incumbent on the operator and drilling contractor to make such an assessment.

Question 15: How robust are the escalation protocols and how closely are they followed once an alert is observed?

BSEE Response: This consideration is left to the operators and drilling contractors to integrate into their operations in a manner best suited to their specific organizational structures.

Question 16: What is the degree in which the circulatory system on the rig is instrumented? There is a high degree of variability across Gulf of Mexico wells as to what levels of sensors or instrumentation exists on which piece of equipment and their connectivity to the data aggregation systems.

BSEE Response: BSEE believes this question is dependent on the specific EKD technology selected and those critical portions of the circulatory system, if any, that are utilized by the EKD technology. BSEE will not prescribe any one technology in whole or in part. Instead, BSEE establishes the Technology Improvement Objective (e.g., the minimum level of performance) that the technology must meet or exceed.

Question 17: Where sensors/instrumentation exists, what are the required accuracy, precision, calibration, redundancy and data acquisition frequency to support the desired thresholds?

BSEE Response: Under the BSEE BAST Process, BSEE will not establish component and subcomponent performance criteria but rather the performance of the EKD system as a whole needs to be assessed in accordance with the Technology Improvement Objective.

Question 18: Do any situations exist where reliance on EKD might actually increase the likelihood or severity of a loss of well control event?

BSEE Response: BSEE recognizes that use of any new technology may impact operations. In the case of EKD this may result in a false sense of security by the drilling crew to rely on the EKD system to identify kicks as opposed to current practice that rely more on real-time observation, interpretation and management of a situation. Ideally, no, it should not increase the likelihood or severity of a LOWC event.