LSU Professors Seek Methods to Cap Subsea Blowouts

The recent BP oil spill shook the Gulf Coast and brought to the nation's attention the immediate need for a quicker capping system for a subsea well blowout.

Records show it took 87 days for the Macondo well to be capped, after releasing 4.9 billion gallons of crude oil into the Gulf of Mexico.

After the great length of time it took to cap the oil flowing out of the Macondo well, and the hazardous effects the spill had on the surrounding wetlands and environment, developing a method to lessen the time it takes to cap a subsea blowout is highly sought after.

Mayank Tyagi, LSU assistant professor of the Craft and Hawkins Department of Petroleum Engineering and the Center for Computation & Technology, is part of a team that was awarded $244,999 for one year from the BP Gulf Research Initiative for the project titled, "Functional Design and Sizing for Subsea Capping System."

The goal is to find out what the minimum, mandatory capabilities are for a generally applicable, quick response subsea capping stack and what supplementary capabilities should be provided by additional modules to achieve all of the functions likely to be necessary for an effective subsea capping, containment, and intervention system. Another aspect of the research is to find out what the required sizes, pressure ratings, and geometries for these components are.

Aiding in the research is Adam T. Bourgoyne Jr., president of Bourgoyne Enterprises, Inc. and LSU professor emeritus, College of Engineering. He has 20 years of experience in conducting multi-investigator research to develop new blowout prevention methods and procedures and has been involved in multiple successful blowout control efforts by industry. Darryl A. Bourgoyne, LSU instructor in the Craft and Hawkins Department of Petroleum Engineering and director of the Well Facility, will also bring expertise and leadership to the project, having prior deepwater well supervision and engineering and research experience investigating deepwater well designs.

"Reducing the time required to cap a subsea blowout has the greatest potential for reducing the environmental impact and economic costs associated with such an event," said Adam Bourgoyne.

"There is a billion dollar industry consortium currently developing standby equipment to respond to future subsea blowouts, but it is strongly influenced by the need to assemble a deployable system quickly so that the deepwater drilling projects can be resumed," said Tyagi. Tyagi's group will provide an independent view to define the design issues related to a subsea capping stack system.

"A generally applicable well containment and intervention capability is a necessary component on an effective system for quickly responding to future deepwater blowouts. A capping stack minimizes the environmental pollution by stopping the flow of oil from the well, whereas other collection and clean up responses do not address the fundamental issue of stopping the pollution," said John Rogers Smith, LSU associate professor of the Department of Petroleum Engineering, who serves as the lead investigator for the project.

The research team will review the available loss-of-well-control incident records over the past 15 years to identify the operational requirements for the new system. The factors studied will be analyzed to 1) imply the worst case magnitude and the critical factors that could have contributed to a worse release and 2) what containment methods would have been likely to be most effective in minimizing the release and the related pollution and hazards for the range of circumstances that could occur.

Another investigation will identify the range of well depths, formation characteristics, and well geometrics representative of deepwater wells that could be sources of major hydrocarbon releases. That knowledge will be used to determine the sizing, pressure ratings, and the internal geometry needed for components of the proposed system.

The results of the two investigations will be the basis for a system analysis to determine what minimum common capabilities should be included in the base module, what other capabilities can be most practically combined within additional modules and how modules should be mated to provide a complete system with the necessary functionality for a given situation. Software will be developed to allow evaluation of a particular configuration for a given situation and assist in identifying weaknesses that require supplementary capabilities.

For more information on this project, visit http://www.cct.lsu.edu/~mtyagi/.
Publish Date:
06-27-2011

Center for Computation & Technology
2003 Digital Media Center • Telephone: +1 225/578-5890 • Fax: +1 225/578-8957