

Public Executive Summary

Title: Design Investigation of Extreme High Pressure, High Temperature (XHPHT), Subsurface Safety Valves (SSSV)

Name of Offeror: Rice University

Project Manager: Don Richardson

Principal Investigator: Ed Akin

Solicitation Number: RFP2007DW1603c (07121-1603c)

Project Start Date: October 16, 2008

Project End Date: October 15, 2010

Total Estimated Cost:	\$	150,000.00
RPSEA Maximum Share:	\$	120,000.00
Rice University Cost Share:	\$	30,000.00

Goal

This project will investigate subsurface safety valve (SSSV) design in support of the development of new designs for application in valves subject to pressures of 30,000 psi and temperatures in excess of 400° F. Such extreme high pressure, high temperature (XHPHT) conditions are expected in ultra-deepwater areas of the Gulf of Mexico.

Background

Accessing the ultra-deepwater reserves of oil and gas in the Gulf of Mexico (GOM) will require a shift in thinking in regards to the design of sub-surface drilling and production components. This project will examine the design of SSSVs. The extreme high pressure and high temperature conditions that future subsurface safety valves will be expected to perform in require an analysis of current design as a stage in the development of the next generation of SSSVs.

This project is a two-year graduate student design task focused on a flapper-type SSSV. It will utilize a parametric modeling system involving several state-of-the-art software tools. Parametric model creation will allow much of the complexity of the analysis to be quickly applied to a variety of valve design or design modifications.

The design of a flapper SSSV is basically an optimization task constrained by very tight spatial limitations. A series of computer models will hopefully lead to a new design for the XHPHT environment. The structural finite element model will include concepts for: the valve body and connections, flapper & seat geometries, hinge pin and springs, hinge pocket, and flow tube.

The project will examine public information from existing valve manufacturer's SSSV design(s) and supporting engineering data and will attempt to identify failure modes, pertinent variables for model construction and the impact each variable has on the valve design. Through research of current designs and construction of models using computer software, this project will seek to lay the groundwork for development of an XHPHT SSSV.

The design studies will be documented in detailed annual written reports. Condensed versions of the final design results will be prepared and submitted as an SPE paper. Electronic copies of the data inputs and outputs generated using a variety of commercial software tools will be posted on a supporting web site. New extensions of software developed during this study they will also be posted in source form along with the supporting data files.

Potential Impacts

The product of this project will be knowledge that can be used to accelerate the development of an improved flapper SSSV design that will in turn reduce the risk of valve failure. Reduced failure risk will result in fewer valve failures after installation and a resulting decrease in shut in production, and valve replacement and maintenance costs.

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