Public Executive Summary

Title: Replacing Chemical Biocides with Targeted Bacteriophages in Deepwater Pipelines and Reservoirs

Name of Offeror: Phage Biocontrol, LLC.
Project Director/Principal Investigator: Dr. Neil Summer

Additional participants: Texas A&M University; Shell International Exploration & Production; ConocoPhillips Company; Petrobras America, Inc.; Halliburton; Nalco Company; Multi-Chem Corporation; BJ Services Company; Champion Technologies, Inc.; Intertek Group plc; INTECSEA; Livermore Instruments, Inc.

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Project Start Date: January 21, 2010
Project End Date: February 21, 2012

Total Estimated Cost:	$	159,443.00
RPSEA Maximum Share:	$	118,406.00
Phage Biocontrol Cost Share:	$	39,443.00

Bacterial fouling leads to serious problems within the oil and gas industry. Microbiologically influenced corrosion (MIC) affects every step of the system, from the production wellhead to the refinery. Bacterially-evolved hydrogen sulfide sours the reservoir, elevating risk and devaluating the product. Bacterial iron sulfide production creates black powder accumulation, causing gas pipeline blockages. Long deepwater pipelines are particularly at risk and costly biocide injection and regular pig runs increase operating expense and downtime. The petroleum industry currently uses chemical biocides to combat bacteria despite the fact that such biocides are only moderately effective. Moreover, such broad-spectrum chemical biocides are harmful to humans and the environment, and are expensive. A new approach to bacterial control is clearly required.

We propose to evaluate the use of bacteriophage, or phage, the natural viral predators of bacteria, in a focused approach to reduce the agents of MIC. Phage are highly specific to their target bacteria and are harmless to any other cells, be they human, animal, plant, or non-targeted bacteria. Conceivably a mixture of phage corresponding to the problem bacteria in a pipeline can be injected at the head of the pipeline. The reservoir can be similarly treated with injection into the near-wellbore area and via the water injection wells to inoculate the formation. Such a targeted phage delivery system will retain beneficial bacteria, save costs and lessen environmental harm over their current chemical equivalents.

Phage specific to sulphate reducing bacteria associated with MIC in Gulf of Mexico pipelines, will be identified and characterized. The ultimate goal is to develop phage cocktails that can be sold to chemical services companies. Joint industry project associates have realized that this concept is disruptive and are positioning themselves for early access and experience with the new phage technologies being developed. Commercialization of phage for initial use in the “closed” systems (i.e. pipelines, reservoirs,

hydrofracture ponds) of the petroleum industry will serve as a model for commercial phage application in the “open” systems of other industrial sectors. From this proof of concept may spring a step-change, which could cause a paradigm shift in anti-microbial approach with the petroleum industry leading the way.

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