

## **Poseidon Sciences and Selenium, Ltd. Announce collaboration to Develop Environmentally Friendly Coating Technology to Prevent Bacteria-Induced Clogging in Hydraulic Fracturing Wells**

**New York, NY - July 27, 2010** - Hydraulic fracturing, a method pioneered by Halliburton, involves sending high pressure fluid containing sand through a well bore deep in an oil/gas bearing shale formation to cause fracture. This is followed by injection of proppants typically composed of ceramic beads that are lodged inside the shale to keep the fracture open. The fractured shale allows free flow of natural gas and oil into the pipeline that brings them to the surface for collection. Over a million wells have been drilled in the United States through this process.

Anaerobic iron and sulfate degrading bacteria rapidly proliferate in the fracturing fluids, causing corrosion of the pipes and clogging of the proppants. Biocides are typically included in the fracturing fluid to inhibit bacterial growth. However, over the years, there has been a tremendous public concern about the environmental impact associated with hydraulic fracturing and, in particular, the possible contamination of the aquifer and nearby streams by biocides and other chemicals present in the fracturing fluid.

### **Extracting US Oil-Gas Reserves**

Considering the economic and strategic value of extracting US oil-gas reserves, an alternative technology needs to be developed as soon as possible to solve this environmental concern. A biocidal approach is still the best method to keep *Gallionella* and *Desulfovibrio* bacteria from clogging the wells and corroding the pipes. However, the biocidal material should be environmentally friendly and must not freely diffuse away from the bore hole. These are daunting challenges.

### **Strategic Partnership with Selenium, Ltd. to Develop Antibacterial Coatings**

On July 21, 2010, Poseidon Sciences and Selenium, Ltd. entered into a strategic partnership to develop coatings containing covalently bound selenium [Se]. Compared to copper or silver, Se is permanently attached to a surface using patented processes and yet continues to be biologically active. Se is approved by the FDA as a nutritional supplement and also possesses anti-bacterial properties through the release of reactive oxygen species, such as hydrogen peroxide.

Upon contact with Se-treated surface, the reactive oxygen released by Se kills the bacteria on contact, thereby preventing biofilm formation and clogging. This killing effect is short range and does not extend far from the coated surface. A "green technology," Selenium's SeLECT™ technology was originally developed within the Texas Tech University [TTU] System by Dr. Ted Reid and Dr. Julian Spallholz, co-chief scientists of Selenium, Ltd. and TTU professors.

The Se proprietary technology already achieved FDA 510(k) approval for two separate Class II medical devices and the first coated antimicrobial orthodontic products were introduced to the market in 2009 to prevent dental plaques.

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When applied to industrial applications, Selenium's patented SeLECT™ technology is marketed under the SeGuard™ brand. Because it is bound permanently to the coating and yet remains bioactive, Se does not have to leave the surface to exert its antimicrobial action. Thus, leaching of SeGuard™ products to the environment is prevented.

"We are very excited to partner with Poseidon Sciences," said Kris Looney, President of Selenium, Ltd. "Poseidon is a recognized leader and international presence in ecofriendly technology solutions. Their selection of Selenium's Se technology is further validation of its broad platform for safe, effective applications. We look forward to working with Poseidon in expanding our technology offering as a complementary component of their highly regarded services."

This technology will find use in the industry as a coating on proppants, sand and other materials used in hydraulic fracturing and in the interior of iron pipelines. Covalently bound SeGuard™ products represent the next generation of non-leaching, environmentally friendly biocidal technology.

Poseidon Sciences and Selenium, Ltd. envision building a strategic relationship with companies involved in the hydraulic fracturing industry to bring this novel technology to commercial stages. For further information regarding this development program, please contact Jonathan R. Matias, Executive Director, Poseidon Sciences Group, phone 718-454-5065 or email [jmatias@poseidonsciences.com](mailto:jmatias@poseidonsciences.com).

### **About Selenium, Ltd.**

Selenium, Ltd. was founded in 2004 based on discoveries made by Co-Chief Scientists Julian Spallholz, Ph.D. and Ted Reid, Ph.D., professors within the Texas Tech University System. Their work revealed that certain organo-selenium molecules are catalytic and produce super oxide radicals, resulting in a lethal, but short-range toxicity to surrounding cells. Thus, selenium-coated surfaces act as an impenetrable barrier to microbes and other cells, and selenium-armed molecules will selectively destroy targeted cells. Selenium, Ltd. is an Emergent Technologies Inc. (ETI) portfolio company, and ETI provides all management services. For more information, visit [www.selenbio.com](http://www.selenbio.com) or contact Kris Looney, President, phone 512-697-8219 or email [klooney@selenbio.com](mailto:klooney@selenbio.com)

### **About Poseidon Sciences**

Poseidon Sciences is a research and development company focusing on a diverse portfolio of technologies with applications in the marine and freshwater systems. The company also has a broad range of interest in alternative technologies to prevent biofouling, coatings research, oil spill response, mariculture, malaria control, natural products and subsea technologies. For more information visit [www.poseidonsciences.com](http://www.poseidonsciences.com).