

Form 2
Submission to Contaminated Water Technology Review Team
 Committee on Countermeasures for Contaminated Water Treatment

Technology Information	
Area	1 and 5
Title	Permanent Managed Underground Barrier for Radioactive Water Control
Submitted by	SEQEnergy, a subsidiary of Graphene Technologies, Novato, CA and Tokyo, Japan
<p>1. Overview of Technologies</p> <p style="text-align: center;">See Appendix PDF "IRID Appendix - SEQEnergy Radioactive Water Barrier Sep 2013"</p> <p>SEQEnergy (SEQ) is subsidiary of Graphene Technologies, a US company with a Japanese Director, Toshiaki Matsukawa (see Form 1). SEQ has developed and patented a managed, long-term, non-excavated, gas and liquids geologic containment system that is highly suitable for <i>both</i> containment of radioactive water at the Fukushima Plant <i>and</i> for blocking fresh water flow through the site.</p> <p>This technology utilizes <i>well-known and proven</i> oil and gas industry tools and methods. The technology was developed by world-class experts in the subject matter. A team of these experts can be made available to Japanese authorities to support evaluation and implementation of this solution.</p> <p>In essence, the SEQ technology is a system of barrier materials, generally epoxies, which are injected into existing geology to form a tight, high strength and resilient barrier system around a target liquid or gas to be stored for long periods of time. The system is designed to be monitored and to be readily repaired if or when leaks are detected. The overall cost of the system is equal to or less than the cost of conventional gas storage systems (salt domes) common in the U.S. Implementation will require a geologic engineering design and contract engagement with a large oil services company who will have the conventional tools and materials to construct the containment system.</p>	
<p>2. Notes</p> <p>- Technology readiness level</p> <p>This system is practiced today by the oil and gas industry as a well management system. Barrier epoxies and materials are injected into wells to prevent geologic zones from producing water or other undesired materials into the well. Such containment zones are monitored and can be repaired by the well manager. The SEQ model in essence modifies current practices such that, rather than designing a system to exclude water flow into the well, the system is designed to both exclude that which is outside the containment zone and securely contain that which is</p>	

within the zone.

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- Challenges

This technology, while well understood, has not been demonstrated at scale. While all the systems, tools and methods are well known and practiced widely today, the technology is nevertheless considered new. As a result, there will be a need to demonstrate the technology at scale prior to widespread adoption. SEQ has sought such a demonstration opportunity in the U.S., but in the U.S., an urgent need has not been identified. However, SEQ believes Fukushima is such an urgent need. Thus, the SEQ technology can serve two Japanese goals: 1) long term mitigation of water flow to the Fukushima Plant site and containment of the radioactive water and 2) a new gas and liquids storage industry based on the SEQ technology which can become a worldwide engineering service offered by Japanese companies.

- Patents

Three Issued U.S. patents:

8,256,991 Engineered, Scalable Underground Storage System and Method. September 4, 2012

8,256,992 Underground Sequestration System and Method. September 4, 2012

8,277,145 Engineered, Scalable Underground Storage System and Method. October 2, 2012

Areas of Technologies Requested: SEQ technology applies to (1) and (5) below.

- (1) Accumulation of contaminated water (Storage Tanks, etc.) APPLIES
- (2) Treatment of contaminated water (Tritium, etc.)
- (3) Removal of radioactive materials from the seawater in the harbor
- (4) Management of contaminated water inside the buildings
- (5) Management measures to block groundwater from flowing into the site APPLIES
- (6) Understanding the groundwater flow

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