Nonconfidential Summary Disclosure

UM 1790: Mobile Process for Solubilization and Disposal of Radioactive Scale & Sludge From Oil and Gas Production

THE TECHNOLOGY

Researchers at the University of Mississippi have developed a laboratory scale process to eliminate the radioactive scale and sludge that occurs during oil and gas production. This process has been laboratory tested on a small scale and shown to be capable of solubilizing over 90% of the radioactivity from typical oilfield scale and sludge samples.

This process can be operated by a single operator and can process up to 8, 55-gallon drums of waste per day. The scale and sludge are mixed with charcoal, pulverized, heated in an oxygen free atmosphere, and cooled to ambient temperature while remaining in an oxygen free atmosphere. The radioactivity and most of the solid material is converted to a water soluble form that can be dissolved, mixed with brine and re-injected into the producing formation. The process requires minimal capital investment, offers portable on-site service, and essentially eliminates liability.

Large quantities of formation waters (brines) are co-produced with hydrocarbons from oil and gas wells. Dissolved solutes from the brines precipitate forming, scale in and on production equipment and sludge in storage tanks. Radium is one of the solutes that may be incorporated into these precipitates, rendering the scales and sludge radioactive. Because of the radioactivity, these materials have to be handled as low level solid radioactive waste. It is estimated that there are over ten million 55 gallon drums of this material in storage and approximately 150,000 more are being produced each year.

PATENT STATUS

U.S. Patent – 7,360,967

PRINCIPAL INVESTIGATOR(S)

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KEYWORDS

Scale, Sludge, Radioactive, Oil and Gas Production, Solubilization

EXISTING METHODS FOR TREATMENT AND DISPOSAL

1. Land spreading: the material is spread on the surface of the ground, tilled into the top few centimeters of the soil, and then covered with a layer of “clean” soil such that the radioactivity is below governmental action levels, and the site can be considered uncontaminated.
2. Burial in a lined pit: The material is placed in a pit with a water impermeable liner, covered with a water impermeable cover and then with soil.
3. Storage in drums at low level radioactive material storage sites: Several producers are temporarily storing these materials at the production site in fenced off areas over gravel beds on impermeable liners awaiting shipment to long term storage facilities.
4. Grinding to a fine particulate, suspending in water, and injecting into underground caverns or the producing formation.
5. Dissolution of the sludge and scales with acid and chelation treatment followed by re-injection into the producing formation. This involves several processing steps and the use of substantial quantities of expensive chemicals.
6. Using the material to fill spent well bores followed by capping with concrete.

Methods 1-4 may require transport to distant sites and the producer may remain liable for the material in perpetuity, while Methods 5-6 return the material to the producing formation. However, these methods may quickly plug the pores in the existing formation, which severely limits the capacity.

DEVELOPMENT POTENTIAL

We are seeking a development and/or commercialization partner to complete a field test and ensure production and cost efficiencies carry through scale up.

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