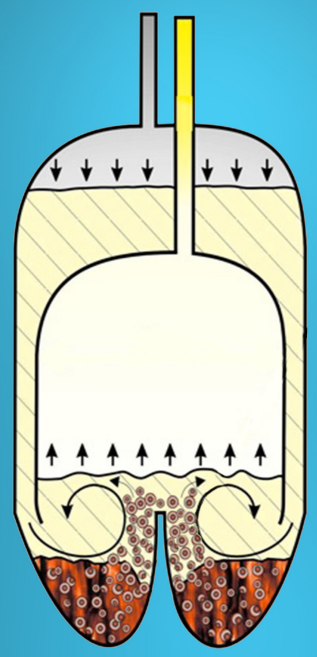
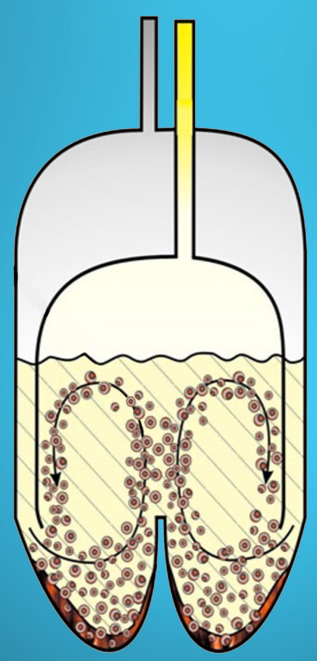
Available for Licensing

NATIONAL ENERGY TECHNOLOGY LABORATORY

Radial Flow Pulse Jet Mixer



The pulse flow will accelerate over the heavy sludge sitting at the bottom of the vessel.



Fluid moves quickly up the sides of the vessel while also forming a focused central fountain.

Opportunity

Research is currently active on the patented technology "A Process for the Mixing of Heavy Solid Particulate Matter in a Lighter Liquid Carrier Fluid Using an Inverted Pulsed Jet Mixing Apparatus." The technology is available for licensing and/or further collaborative research from the U.S. Department of Energy's National Energy Technology Laboratory.

Overview

This invention addresses a problem posed by some large-size nuclear waste particles during a mixing process impacting the ultimate transportation of the waste. The technology associated with this invention provides researchers with a method to selectively mix large and small particles in a carrier fluid to enable transportation of the waste.
The U.S. Department of Energy adopted existing technology, called pulsed jet mixers, at its Hanford Nuclear Waste Treatment facility to mix particulate solid nuclear waste material in a liquid carrier fluid within a containment vessel. However, because the particulate material has an extensive range of sizes and weights, the largest and heaviest particles tend to settle very quickly, thereby complicating the mixing process. The existing pulse jet mixers are capable of mixing approximately 80 percent of the waste. This new technology will allow mixing of all waste.
The conventional technology uses decelerating flows to entrain and lift particles. This causes particles to collect and resist any mixing action.
This invention uses accelerating flows to lift and separate particles.
The accelerating flow is focused thereby controlling the particle lifting mechanism.
In summary, this new inverted pulsed jet mixing apparatus can successfully suspend solid nuclear waste in a carrier fluid with a more uniform mass fraction than the currently used technology.

Significance

- Energy mixing is maximized
- Mobilizing of the particulates is complete
- No "dead zones" exist
- Packing of material is minimized
- Eroding effects are significantly reduced

(continued)

Applications

- Mining: particle separation
- Mixing nuclear waste at Hanford
- Any similar industrial process involving heavy solids in a carrier fluid

Related Patents

U.S. Patent No. **8,469,583**, issued June 25, 2013, titled "A Process for the Mixing of Heavy Solid Particulate Matter in a Lighter Liquid Carrier Fluid Using an Inverted Pulsed Jet Mixing Apparatus." Inventor: John VanOsdol

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