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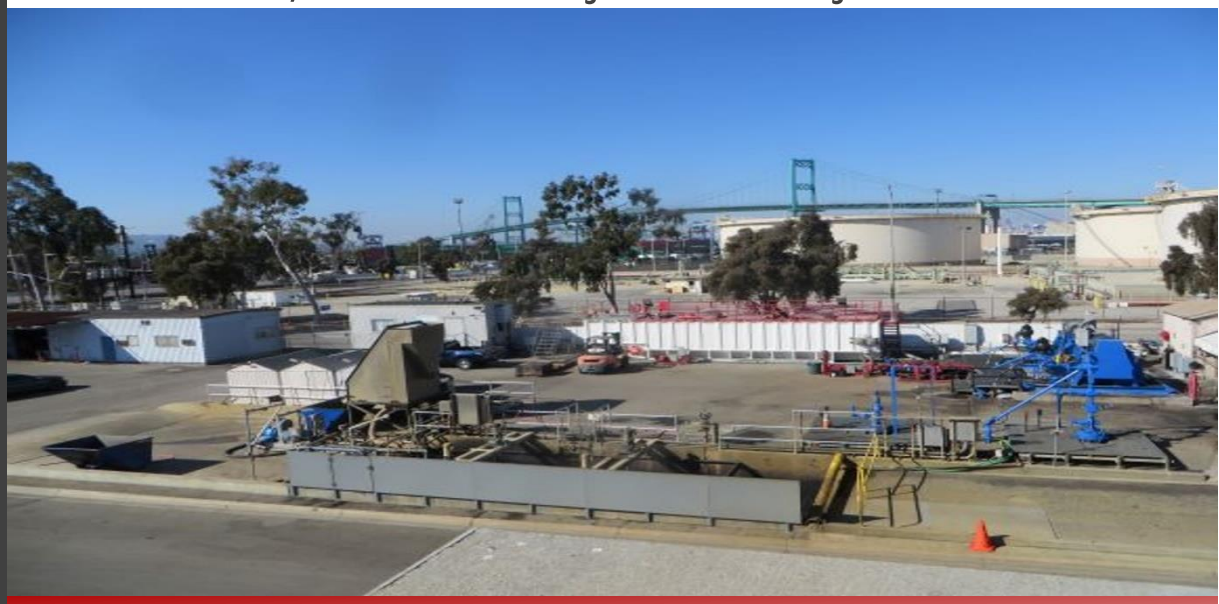
TIRE FACILITY

City of Los Angeles Digested Sludge, Biosolids, and Brine Injection Project



LOCATION

Operations started in July 2008 at the Terminal Island Treatment Plant in Los Angeles, California.

ACCEPTED WASTES

Biosolids management via Deep Earth Digestion/ Sequestration. The project handles 20% of all biosolids/ sludge produced by the city of Los Angeles. Acceptimg Reverse Osmosis Brine generated in the plant.

VOLUMES

Over 360 million gallons of Biosolids injected

ENVIRONMENTAL SOLUTION

Green House Gases avoided or sequestered:

- Over 15,733 tons CO_2
- 26 tons of NO_x
- 6.35 tons of CO

Deep well sequestration eliminates environmental impacts from landfarming, reduces operational risks, and provides significant GHG emission reductions

The Terminal Island Renewable Energy ("TIRE") project is the USA's first full scale facility to dispose biosolids, brine effluent and tertiary effluent by deep well injection and geothermal biodegradation.

- Initiated operations in July 2008 as an EPA demonstration project
- Site now manages 100% of the biosolids from the City of Los Angeles Terminal Island Plant and about 20% of the residuals output from the Hyperion Treatment Plant.
- The process is monitored with advanced geophysical tools, including downhole pressure sensors, fiber optic temperature sensors, periodic geophysical logging, and offset well fluid and gas sampling. The monitoring and analyses confirm containment in the deep target interval, and have verified carbon dioxide sequestration and methane generation.

Bureau of Sanitation's Renewable Energy Project Wins National League of Cities 2010 Award of Excellence

The City of Los Angeles Terminal Island Renewable Energy (TIRE) biosolids (bio-slurry) injection project has received a National League of Cities (NLC) 2010 Award for Municipal Excellence. The award recognizes cities and towns for outstanding programs that improve the quality of life in America's communities. The City of Los Angeles accepted its Silver Award for the more than 500,000 population category at the NLC's Congress of Cities and Exposition in Denver, Colorado.

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Biosolids Management Through Deep Earth Injection/ Sequestration

FREQUENTLY ASKED QUESTIONS

Q: Will this project risk contamination of drinking water?
A: No, injection formations are well below acquifers and protected reservoir. Projects are engineered and monitored to ensure safe disposal.

Q: Will this project cause an earthquake?
A: No, earthquakes will not occur because of this process.

Q: Will this project increase air pollution?
A: No, quite the opposite, emmissions are reduced.

Q: Does this technology save energy?
A: Yes, it saves energy and generates a clean form of energy

Q: Why evaluate this technology?
A: The status-quo is not enough and is not sustainable

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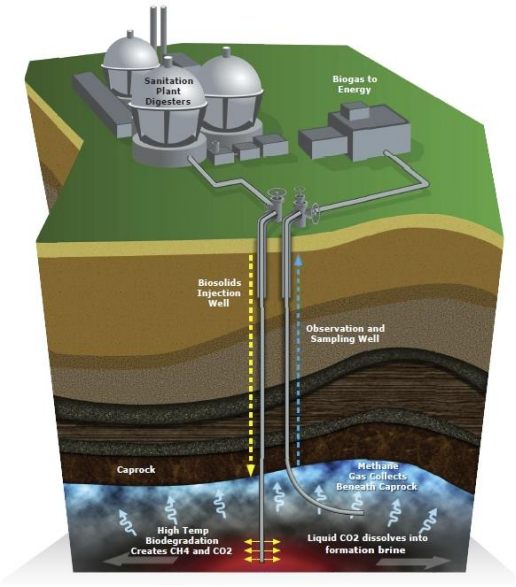

THE NEED

Millions of tons of sewage sludge and biosolids are generated each year by municipal sanitation agencies around the world. In the United States and elsewhere, most biosolids are trucked long distances and spread on rural land or, in some cases, pumped into waterways or oceans. However, costs of these activities are steadily increasing while the environmental impacts are becoming less tenable. Environmentally and economically sustainable alternatives are desperately needed.

THE SOLUTION

Patented technology to manage municipal sludge with significant environmental benefits. We call this technique Deep Earth Digestion / Sequestration. Through appropriate geological formation selection, well design, and advanced geophysical monitoring, the biosolids slurry can be injected into soft, porous, sand formations in the deep subsurface (on the order of 5000 ft or more).

THE PROCESS

1. Inject municipal sludge into deep geologic formations.
2. Material undergo natural process of high-temperature anaerobic biodegradation, which sterilizes the material within 24 hours.
3. Material starts conversion to methane and carbon dioxide over time (30-60 days).
4. Design the process to capture and sequester generated carbon dioxide in formation water.
5. Store or recover high purity methane for beneficial use.

RECYCLING MUNICIPAL WASTE TO ENERGY

At the high temperature and pressure conditions in the deep subsurface, carbon dioxide is ten times more soluble in water than methane. Therefore, as the gas percolates through the formation water, the carbon dioxide will be preferentially absorbed by the water, leaving a relatively methane rich gas phase. Due to density segregation, the gas will percolate upwards through the brine filled porous sand formation until it reaches the impermeable capping shale formation. The resulting relatively pure methane gas can be stored for subsequent beneficial use at the subsurface, in the same way biogas generated from surface digesters is currently used at many modern sanitation plants.

ENVIRONMENTAL & ECONOMIC ANALYSIS

- Enhanced treatment and sterilization of biosolids.
- Greater protection for surface and shallow groundwaters.
- Provides a local solution, reducing long distance truck traffic.
- Reduced greenhouse gas emissions to the atmosphere.
- Recycles waste into high quality clean energy for beneficial use.

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