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Integrated Waste Treatment Unit

The Integrated Waste Treatment Unit (IWTU), a first-of-a-kind, 53,000-square-foot facility, will treat 900,000 gallons of liquid radioactive and hazardous waste that has been stored in underground storage tanks.

The waste that will be treated – called sodium-bearing waste – was generated from operations at Idaho Nuclear Technology and Engineering Center (INTEC). The liquid is stored in three stainless steel 300,000-gallon storage tanks that are part of a tank farm of 15 tanks.

IWTU, located east of INTEC, will use a steam-reforming technology to convert the liquid to a solid, granular material; packaging it in stainless steel canisters; and storing the containers in concrete vaults at the site.

Any emissions generated during the treatment campaign will be filtered through high-efficiency particulate air (HEPA) and Granulated Activated Charcoal filters and sampled to ensure regulatory requirements are met. Steam reforming is used successfully in a variety of chemical and petrochemical applications. It is currently being used at a facility in Erwin, Tenn., to primarily treat radioactive resin wastes from commercial nuclear facilities.

Treatment of sodium-bearing waste supports the regulatory agreements between the DOE and state of Idaho.

Once the three underground storage tanks containing the waste have been emptied, they – like the previous tanks – will be thoroughly washed and filled with a concrete grout mixture. The entire tank farm will eventually be capped.

IWTU process system flow diagram on reverse.

Fluor IDAHO

PROJECT STATUS

Following five prior demonstration runs where a waste simulant was used to test the facility's treatment processes, the IWTU is currently undergoing a series of modifications to remedy its mechanical and chemical challenges. During a February/March 2017 demonstration run, a newly redesigned auger-grinder, with a more aggressive blade pattern and higher horsepower output, was successfully tested. The previous auger-grinder experienced difficulty at transferring the granulized solid product out of the treatment vessel. The new model operated as designed during the latest 18,000-gallon demonstration run.

Modifications to the Denitration Mineralization Reformer, the IWTU's primary reaction vessel, are continuing with the replacement of the ring header planned for this summer. The ring header injects gases and steam into the DMR to keep the treatment media inside the vessel fluidized. It requires replacement and modification since it was damaged during a prior demonstration run.

Additional testing with a scaled pilot plant is continuing at Hazen Research in Colorado. Engineers, using an 18-inch DMR-type model, are working to improve the fluidization, speed up the conversion from liquid to solid, and better control the vessel temperature. What's being learned at Hazen will be applied to the IWTU and tested during the next demonstration run in 2018.