



Waste Management Conference (W.M.)

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Poster Abstract:

Ceramatec Inc. has developed an efficient and scalable modular electrolytic Caustic Recycling System (CRS) using a NaSelect[®] ceramic membrane based process to separate sodium from Low Activity Waste (LAW) streams at Hanford site. The process selectively removes up to 80% of sodium hydroxide from LAW Effluent stream and produces up to 50% concentrated caustic for reuse onsite and significantly reduces the volume of the sodium bearing waste.

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ABSTRACT

Ceramatec has successfully demonstrated the NaSelect[™] (sodium super ionic conductor) ceramic membrane based electrolytic process to recycle sodium from several Low Activity Waste (LAW) simulants and actual wastes to generate “usable” sodium hydroxide for reuse onsite. This sodium recovery process allows for recycling of the caustic (NaOH) used to remove aluminum during sludge washing as a pretreatment step in the vitrification of radioactive waste. The sodium recovery process will decrease the LAW volume by as much as 39%. A technology demonstration scale unit (TDU) was successfully developed and demonstrated to process NTCR (Near Tank Cesium Removal) effluent feeding at 7 l/hr to make up to 30 wt% of sodium hydroxide. This process separated about 80% of sodium from the NTCR feed simulant before alumina precipitation was observed. Tens of thousands of hours of testing has been performed with the single and multiple prototypical cells to develop and scale up the design of the Caustic Recycling Unit to recycle sodium hydroxide from multiple simulant feed LAW compositions from Hanford site. The ability of the caustic recycling NaSelect[™] membrane based process to recycle caustic from several simulant chemistries representative of actual wastes on site was successfully demonstrated. Based on testing with the single tubular membrane cell units, the prototype unit to configure multiple tubular membranes to handle higher feed throughput was developed. , A sub-pilot scale modular system was designed, built and operated to process higher through put of LAW simulant stream. Presently a Caustic Recycling Unit (CRU) is being built to

recycle free sodium hydroxide from NTCR effluent as part of an integrated Near Tank Treatment System (NTTS) pilot demonstration with Continuous Sludge Leaching (CSL) and NTCR for reuse of caustic from the CRU process in the CSL process is in progress. The pilot scale system will process 16.6 liters per hour (4.4 gal/h) of NTCR effluent and generate 10M concentration of “usable” sodium hydroxide at 9.33 kilograms per hour.