

INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Part I: Background Information

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| Title: Deep Sludge Gas Release Event Analytical Evaluation | | Information Category: <input checked="" type="checkbox"/> Abstract <input type="checkbox"/> Journal Article <input type="checkbox"/> Summary <input type="checkbox"/> Internet <input type="checkbox"/> Visual Aid <input type="checkbox"/> Software <input type="checkbox"/> Full Paper <input type="checkbox"/> Report <input type="checkbox"/> Other |
| Publish to OSTI? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No | | |

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Author: Terry L. Sams

Purpose of Document: Abstract submittal for presentation at Waste Management 2014

Part II: External/Public Presentation Information

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Sponsoring Organization(s): DOE, WM Symposium

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Will Material be Handed Out? Yes No Will Information be Published? Yes No (If Yes, attach copy of Conference format instructions/guidance.)

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| Responsible Manager | Engineering | 8/13/13 | W.L. Jason / Jason 8/13/13 |
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Part VI: Final Review and Approvals

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Deep Sludge Gas Release Event Analytical Evaluation

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
Office of River Protection under Contract DE-AC27-08RV14800

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Deep Sludge Gas Release Event Analytical Evaluation

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By Julia Raymer at 2:56 pm, Aug 15, 2013

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Deep Sludge Gas Release Event Analytical Evaluation

Terry L Sams

The purpose of the Deep Sludge Gas Release Event Analytical Evaluation (DSGRE-AE) is to evaluate the postulated hypothesis that a hydrogen GRE may occur in Hanford tanks containing waste sludges at levels greater than previously experienced. There is a need to understand gas retention and release hazards in sludge beds which are 200 -300 inches deep. These sludge beds are deeper than historical Hanford sludge waste beds, and are created when waste is retrieved from older single-shell tanks (SST) and transferred to newer double-shell tanks (DST). Retrieval of waste from SSTs reduces the risk to the environment from leakage or potential leakage of waste into the ground from these tanks.

However, the possibility of an energetic event (flammable gas accident) in the retrieval receiver DST is worse than slow leakage. Lines of inquiry, therefore, are (1) can sludge waste be stored safely in deep beds; (2) can gas release events (GRE) be prevented by periodically degassing the sludge (e.g., mixer pump); or (3) does the retrieval strategy need to be altered to limit sludge bed height by retrieving into additional DSTs? The scope of this effort is to provide expert advice on whether or not to move forward with the generation of deep beds of sludge through retrieval of C-Farm tanks. Evaluation of possible mitigation methods (e.g., using mixer pumps to release gas, retrieving into an additional DST) are being evaluated by a second team and are not discussed in this report.

While available data and engineering judgment indicate that increased gas retention (retained gas fraction) in DST sludge at depths resulting from the completion of SST 241-C Tank Farm retrievals is not expected and, even if gas releases were to occur, they would be small and local, a positive USQ was declared (Occurrence Report EM-RP--WRPS-TANKFARM-2012-0014, "Potential Exists for a Large Spontaneous Gas Release Event in Deep Settled Waste Sludge"). The purpose of this technical report is to (1) present and discuss current understandings of gas retention and release mechanisms for deep sludge in U.S. Department of Energy (DOE) complex waste storage tanks; and (2) to identify viable methods/criteria for demonstrating safety relative to deep sludge gas release events (DSGRE) in the near term to support the Hanford C-Farm retrieval mission. A secondary purpose is to identify viable methods/criteria for demonstrating safety relative to DSGREs in the longer term to support the mission to retrieve waste from the Hanford Tank Farms and deliver it to the Waste Treatment and Immobilization Plant (WTP).

The potential DSGRE issue resulted in the declaration of a positive Unreviewed Safety Question (USQ). C-Farm retrievals are currently proceeding under a Justification for Continued Operation (JCO) that only allows tanks 241-AN-101 and 241-AN-106 sludge levels of 192 inches and 195 inches, respectively. C-Farm retrievals need deeper sludge levels (approximately 310 inches in 241-AN-101 and approximately 250 inches in 241-AN-106). This effort is to provide analytical data and justification to continue retrievals in a safe and efficient manner.