

# INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

## Part I: Background Information

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	
Document Number: WRPS-55816-A Rev. 0	Date: 8/13/2013

Author: Terry L. Sams

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

## Part II: External/Public Presentation Information

Conference Name: Waste Management 2014	
Sponsoring Organization(s): DOE, WM Symposium	
Date of Conference: March 2-6, 2014	Conference Location: Phoenix, AZ
Will Material be Handed Out? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Will Information be Published? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>(If Yes, attach copy of Conference format instructions/guidance.)</i>

## Part III: WRPS Document Originator Checklist

Description	Yes	N/A	Signature
Information Product meets requirements in TFC-BSM-AD-C-01?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Document Release Criteria in TFC-ENG-DESIGN-C-25 completed? (Attach checklist)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
If product contains pictures, safety review completed?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

## Part IV: WRPS Internal Review

Function	Organization	Date	Print Name/Signature/Date
Subject Matter Expert	Process Engineering	8/12/13	TERRY Sams / Aug 12-13
Responsible Manager	Engineering	8/13/13	W.L. Ison / W.L. Ison 8/13/13
Other:			

## Part V: IRM Clearance Services Review


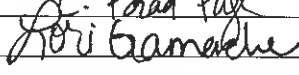
Description	Yes	No	Print Name/Signature														
Document Contains Classified Information?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	If Answer is "Yes," ADC Approval Required  _____ Print Name/Signature/Date														
Document Contains Information Restricted by DOE Operational Security Guidelines?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Reviewer Signature:  _____ Print Name/Signature/Date														
Document is Subject to Release Restrictions? <i>If the answer is "Yes," please mark category at right and describe limitation or responsible organization below:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Document contains: <table style="width: 100%;"> <tr> <td><input type="checkbox"/> Applied Technology</td> <td><input type="checkbox"/> Protected CRADA</td> </tr> <tr> <td><input type="checkbox"/> Personal/Private</td> <td><input type="checkbox"/> Export Controlled</td> </tr> <tr> <td><input type="checkbox"/> Proprietary</td> <td><input type="checkbox"/> Procurement - Sensitive</td> </tr> <tr> <td><input type="checkbox"/> Patentable Info.</td> <td><input type="checkbox"/> Business - Sensitive</td> </tr> <tr> <td><input type="checkbox"/> Predecisional Info.</td> <td><input type="checkbox"/> UNCNI</td> </tr> <tr> <td><input type="checkbox"/> Restricted by Operational Security Guidelines</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other (Specify)</td> <td></td> </tr> </table>	<input type="checkbox"/> Applied Technology	<input type="checkbox"/> Protected CRADA	<input type="checkbox"/> Personal/Private	<input type="checkbox"/> Export Controlled	<input type="checkbox"/> Proprietary	<input type="checkbox"/> Procurement - Sensitive	<input type="checkbox"/> Patentable Info.	<input type="checkbox"/> Business - Sensitive	<input type="checkbox"/> Predecisional Info.	<input type="checkbox"/> UNCNI	<input type="checkbox"/> Restricted by Operational Security Guidelines		<input type="checkbox"/> Other (Specify)	
<input type="checkbox"/> Applied Technology	<input type="checkbox"/> Protected CRADA																
<input type="checkbox"/> Personal/Private	<input type="checkbox"/> Export Controlled																
<input type="checkbox"/> Proprietary	<input type="checkbox"/> Procurement - Sensitive																
<input type="checkbox"/> Patentable Info.	<input type="checkbox"/> Business - Sensitive																
<input type="checkbox"/> Predecisional Info.	<input type="checkbox"/> UNCNI																
<input type="checkbox"/> Restricted by Operational Security Guidelines																	
<input type="checkbox"/> Other (Specify)																	
Additional Comments from Information Clearance Specialist Review?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Information Clearance Specialist Approval <div style="border: 1px solid green; padding: 2px; display: inline-block; color: green; font-weight: bold;">APPROVED</div> <i>By Julia Raymer at 2:50 pm, Aug 15, 2013</i> _____ Print Name/Signature/Date														

When IRM Clearance Review is Complete - Return to WRPS Originator for Final Signature Routing (Part VI)

## Part VI: Final Review and Approvals

8-15-13

## INFORMATION CLEARANCE REVIEW AND RELEASE APPROVAL

Description	Approved for Release		Print Name/Signature
	Yes	N/A	
WRPS External Affairs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	 Brad Page
WRPS Office of Chief Counsel	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
DOE – ORP Public Affairs/Communications	<input checked="" type="checkbox"/>	<input type="checkbox"/>	 Lori Gamache
Other:	<input type="checkbox"/>	<input type="checkbox"/>	
Other:	<input type="checkbox"/>	<input type="checkbox"/>	

Comments:

**APPROVED**

By Julia Raymer at 2:50 pm, Aug 15, 2013

**Approved for Public Release;  
Further Dissemination Unlimited**

### Information Release Station

Was/Is Information Product Approved for Release? ☒ Yes ☐ No

If Yes, what is the Level of Releaser? ☒ Public/Unrestricted ☐ Other (Specify) \_\_\_\_\_

Date Information Product Stamped/Marked for Release: 08/15/2013

Was/Is Information Product Transferred to OSTI? ☒ Yes ☐ No

**Forward Copies of Completed Form to WRPS Originator and WRPS CIO Office**

Description	Yes	N/A	Print Name/Signature
WRPS Information Product	<input type="checkbox"/>	<input type="checkbox"/>	
Conference Paper Guidelines	<input type="checkbox"/>	<input type="checkbox"/>	
Trademark/Copyright "Right to Use" Information or Permission Documentation	<input type="checkbox"/>	<input type="checkbox"/>	
WRPS Administrative Checklist	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	

# 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



**P.O. Box 850**  
**Richland, Washington 99352**

# Deep Sludge Gas Release Event Analytical Evaluation

T. L. Sams

Washington River Protection Solutions

Date Published  
August 2013

To be Presented at  
Waste Management 2014

DOE, Waste Management Symposium  
Phoenix, AZ

03/02/2014

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



**P.O. Box 850**  
**Richland, Washington 99352**

## Copyright License

By acceptance of this article, the publisher and/or recipient acknowledges the U.S. Government's right to retain a non exclusive, royalty-free license in an to any copyright covering this paper.

**APPROVED**

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

Release Approval

Date

**Approved for Public Release;  
Further Dissemination Unlimited**

**LEGAL DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or any third party's use or the results of such use of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

This report has been reproduced from the best available copy.

Printed in the United States of America

## 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.