DOE F 1325.8

United States Government **Department of Energy**

memorandum

Carlsbad Field Office
Carlsbad, New Mexico 88221

DATE: May 31, 2005

REPLY TO ATTN OF: CBFO:OCT:KWW:VW:05-1164:UFC:5822

SUBJECT: Method for Reporting HSG in 100-Gallon Drums Containing Supercompacted 55-Gallon Drums with Rigid Liners

TO: Distribution

This memorandum is issued to establish a consistent and conservative method to obtain headspace gas (HSG) concentrations in 100-gallon drums containing supercompacted 55-gallon drums with rigid liners. This method shall only be applied to 55-gallon drums with rigid liners with HSG concentration measurements made in accordance with the Hazardous Waste Facility Permit (HWFP).

An upper bound of the mass of each Volatile Organic Compound (VOC) is established for the headspace in each 55-gallon drum prior to supercompaction. This upper bound is derived from an assumption that 90% of the 55-gallon drum, a volume of 187.4 liters, contains gas with the measured concentrations (only 10% of the drum is filled with solid material). To establish the HSG concentration within the 100-gallon drum containing the 55-gallon drums with rigid liners after compaction, the total mass for each VOC constituent in all drums shall be summed and then assumed to be present as a gas in the headspace volume of the 100-gallon drum.

This process will be included in the appropriate Advanced Mixed Waste Treatment Project (AMWTP) procedure. The steps that will be used to perform this estimate are:

1. Perform headspace gas sampling and analysis on the 55-gallon drums using approved procedures.

2. Convert the HGS results from ppmv to mg/L for each constituent individually.

3. Calculate the mass of each VOC constituent in the drum headspace using:

   VOC_{mass} = HGS Concentration (mg/L) x 187.4 L

4. Sum each individual constituent VOC_{mass} for each compacted drum that are combined into the 100-gallon drum. Non detected VOC concentrations count as zero in the summation.

5. Divide the sum by the volume of headspace in the 100-gallon (378.6-liter), drum using:

   100-gallon drum headspace volume in liters = (100% - % Fill Reported to WWIS)/100 x 378.6

050550

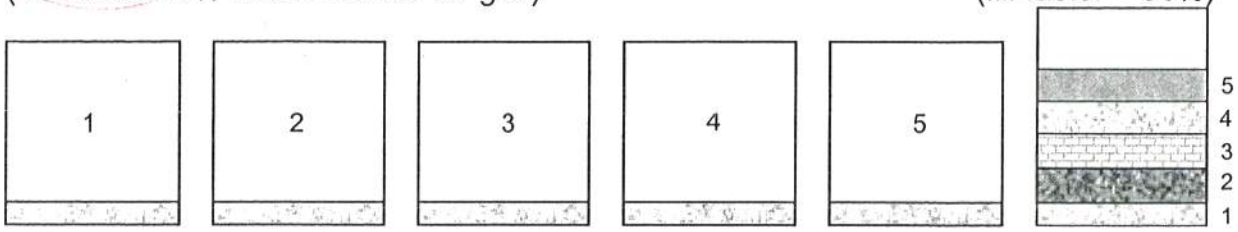
6. Convert the HGS results from mg/L to ppmv for each constituent individually.

7. Record these calculations in the drum certification records and report these calculated VOC concentrations as the headspace gas VOC concentrations in WIPP Waste Information System (WWIS).

Example using five 55-gallon drums with rigid liners:

Individual 55-gallon drums with rigid liners (assumed 90% void available for gas)

Overpack container (fill factor = 85%)



Using constituent headspace gas concentrations for each constituent in each drum, convert these concentrations to mass of each constituent *using 90% void volume*, then sum across the drums to get total mass of each constituent which will be assumed to disperse in the overpack void volume.

Drum	Constituent [A] in 55-gallon drum (mg/L)	Constituent A mass (mg) **(mg/L x 187.4 L)**
1	5	937
2	8	1499
3	12	2249
4	9	1686
5	50	9369
Total		**15740**

Conversion factors: 3.78541 liters/gallon, 55 gallons = 208.2 liters x 0.9 = 187.4 L

Then divide the total constituent mass by the void volume based on the fill factor of the 100-gallon drum. In this example with 5 pucks in the 100 gallon drum void volume, a fill factor of 85% is used. Hence:

HSG Concentration for constituent "A" = 15740 mg ÷ ((100 - 85)/100 x 378.6 L) = 277 mg/L.

Once you have revised the appropriate procedure to perform this calculation and it has been approved by CBFO, you may use it to develop data to certify, input into WWIS, and ship 100-gallon drums containing supercompacted 55-gallon drums with rigid liners. Adherence to this method for reporting HSG in 100-gallon drums containing supercompacted 55-gallon drums with rigid liners will be one of the areas reviewed during the AMWTP recertification audit in August –September 2005.

If you have any questions, please contact me at (505) 234-7357.

Kerry W. Watson, Director
Office of Characterization and Transportation

cc:

M. Navarrete, CBFO	*ED
J. Bearzi, NMED	
S. Zappe, NMED	
S. Holmes, NMED	ED
C. Walker, TechLaw	ED
C. Riggs, CTAC	ED
S. Yeager, LANL	ED
L. Greene, LANL	ED
CBFO M&RC	

Distribution:

Richard Provencher, DOE-ID	ED
Jeff Snook, DOE-ID	ED
Jerry Wells, DOE-ID	ED
Charles Maggart, DOE-ID	ED
John Medema, DOE-ID	ED
Eric Schweinsberg, AMWTP	ED
Elvin Dumas, AMWTP	ED
Bob Miklos, AMWTP	ED
Lisa Woolford, AMWTP	ED
Jeff Mousseau, AMWTP	ED
Joan Connolly, AMWTP	ED
Scott Raish, AMWTP	ED
Sherry Walker, AMWTP	ED

*ED denotes Electronic Distribution

CBFO:OCT:KWW:VW:05-1164:UFC:5822