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date: April 20, 2005

to: David S. Kessel

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from: Martin B. Nemer

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M B Nemer 4-20-05

Technical

Review: James Garner

Performance Assessment and Decision Analysis (Dept. 6821)

J W Garner 4-20-05

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Review: Mario J. Chavez

Carlsbad Programs Group (Dept. 6820)

Mario Chavez

subject: Updated value of WAS_AREA:PROBDEG

The parameter WAS_AREA:PROBDEG is a sampled indicator function which tells BRAGFLO whether microbial gas-generation occurs and what type of material biodegrades. The probability distribution for PROBDEG is a delta function. The type of distribution will not be changed for the upcoming 2004 CRA PABC, but the allowed values and probabilities will, as described below.

In the 1997 PAVT, and the 2004 CRA PA, PROBDEG had the following values and probabilities (P):

PROBDEG = 0	no microbial degradation	(P = 0.5)
PROBDEG = 1	microbial degradation of cellulose only	(P = 0.25)
PROBDEG = 2	microbial degradation of all CPR material	(P = 0.25)

In the above definition, CPR means all cellulosics, plastics and rubber. In the case of PROBDEG = 0, BRAGFLO sets the rates of microbial gas generation equal to zero. In the case of PROBDEG = 1, BRAGFLO sets the initial inventory of biodegradable material equal to only cellulosics material, such as wood, paper and cloth. In the case of PROBDEG = 2, BRAGFLO sets the initial inventory of biodegradable material equal to all cellulosics, plus rubber and plastics.

In the March 4, 2005 letter for the upcoming 2004 CRA PABC (Cotsworth, 2005), EPA dictated to DOE that the probability of microbial degradation and gas generation must be changed from 0.5 to 1. EPA's position is that given new science on extremophiles, they believe that there is

always some possibility of microbial activity. For the 2004 CRA PABC, DOE has agreed to implement EPA's position and thus the parameter PROBDEG will be changed. In response to EPA, DOE argued that the probability of cellulose decomposing should be increased but not the probability of all CPR degrading. This assertion comes from experiments performed at Brookhaven National Laboratory in which cellulose and plastics & rubbers were inoculated with microbes and allowed to biodegrade for 10 years (Francis et al., 1997). In these experiments, cellulose yielded significant microbial gas generation, but plastics and rubbers did not. EPA accepted this assertion which leads to the following values and probabilities for WAS_AREA:PROBDEG

PROBDEG = 0	no microbial degradation	(P = 0)
PROBDEG = 1	microbial degradation of cellulose only	(P = 0.75)
PROBDEG = 2	microbial degradation of all CPR material	(P = 0.25)

This will be implemented in the WIPP parameter database by changing the range of values assigned to PROBDEG from 0,1,2 (CCA, 1997 PAVT, 2004 CRA PA) to 1 or 2, and assigning the probabilities to each value as given above.

References

- Cotsworth, E. (2005). EPA letter on conducting the performance assessment baseline change (PABC) verification test. U.S. EPA, Office of Radiation and Indoor Air, Washington, D.C. ERMS# 538858.
- Francis, A. J., J. B. Gillow and M. R. Giles (1997). Microbial Gas Generation Under Expected Waste Isolation Pilot Plant Repository Conditions. Sandia National Laboratories, Albuquerque, NM. SAND96-2582. ERMS#244883.



Delegations for **KESSEL, DAVID S. (06821)**

Delegated Role Assignments

ITS Manager (06821)			
ITS Rev Manager (06821)			
ITWD Manager (06821)			
ITWD Originator (dskesse)			
ITWD Reviewer (dskesse)			
MWR Manager (06821)			
PA Rec Mgr Reviewer (06821)			
PA Receiving Mgmt (06821)			
PA Send Mgr Reviewer (06821)			
PA Sending Mgmt (06821)			
Paper Signature Authority (06821)			
<u>delegated to</u>	<u>start date</u>	<u>end date</u>	<u>type</u>
<u>RIGALI, MARK J. (06822)</u>	10/09/2003	12/30/2005	Temporary
PHN Manager (06821)			
RA Center Approver (06821)			
RA Manager (06821)			
RA Rev Center (06821)			
RA Rev Manager (06821)			
RC Manager (06821)			
Spot Awards Originator (06821)			
TCR Phone Reviewer (dskesse)			

Help

Mark J. Rigali 4/20/05