Department of Energy
Carlsbad Field Office
P. O. Box 3090
Carlsbad, New Mexico 88221

February 19, 2010

Mr. Tom Kelly, Acting Director
Office of Radiation and Indoor Air
U. S. Environmental Protection Agency
1310 L Street, NW
Washington D.C., 20005

Subject: Response to the Environmental Protection Agency October 19, 2009 Letter on the 2009 Compliance Recertification Application

Dear Mr. Kelly:

In response to the Environmental Protection Agency (EPA) letter of October 19, 2009, the U.S. Department of Energy (DOE) is providing information that answers the remaining questions included in the enclosure to that letter.

This submittal includes four enclosures. Enclosure 1 is a hard copy of the responses. Enclosure 2 (on compact disc) provides references that were not previously submitted with the CRA-2009. Enclosure 3 is a cumulative list of errata that have been identified and corrected up to this point. An updated list will be submitted to EPA with future submittals. Enclosure 4 is a table with a summary of comments received, DOE responses in this submittal, responses previously submitted and responses still pending.

If you have any questions, please contact Russ Patterson at (575) 234-7457.

Sincerely,

David C. Moody
Manager

Enclosure(s)

cc: w/enclosures

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CBFO:ORC:RLP:MDA:10-0931:UFC 5486.00

EPA Comment

3-24-1

Table 5-4 of PAIR 2008 provides without comment a comparison of waste material parameters used in the PABC and PABC09 (the 2009 PABC). Significant reductions are noted for materials (e.g., 26% for iron-based) and CPR (e.g., 12 to 33%). Since these materials have important implication for the PA, DOE needs to provide a discussion as to the cause for these changes.

DOE Response

The inventories and timeframes used to support the Compliance Recertification Application – 2004 (CRA - 2004) Performance Assessment Baseline Calculation (PABC) and the CRA – 2009 PABC have changed since the last recertification and are shown in Table 1.

Table 5-4 of the Performance Assessment Inventory Report (PAIR) - 2008 provides a comparison of current PA waste material parameters to those used in the CRA - 2004 PABC. There are many factors that influence this inventory information. These factors include the impact of scaling waste data for PA, the impact of accounting for waste that is emplaced in WIPP, changes in waste data that are identified when waste is characterized, changes caused by separating or combining waste streams and identification of waste that cannot be disposed of at WIPP such as low-level waste. Based on characterization results, the waste in site waste streams has been redistributed among existing waste streams, assigned to new waste streams at the sites, removed from TRU waste inventory via another disposition path (such as low level waste) and some waste has been emplaced in the Waste Isolation Pilot Plant (WIPP). The overall effect of this redistribution and disposal process results in changes in waste material data, as well as, changes in volumes of waste streams that ultimately affect the mass of materials reported for waste streams and for sites in total.

Table 1 - Reports and Inventory Timeframes Supporting WIPP Recertification

Performance Assessment	Inventory Used	Inventory Cut Off Date
CRA – 2004 PABC	TWBIR-2004 (DOE 2006)	September 30, 2002
CRA – 2009 PABC	ATWIR-2008 (DOE 2008)	December 31, 2007

The data in Table 5.4 of the PAIR-2008 was scaled and reported in density (kg/m^3). This data came from queries of un-scaled data as reported by the waste generator sites and published in the Annual Transuranic Waste Inventory Report-2008 (ATWIR-2008) (DOE 2008) and from queries from the Transuranic Waste Baseline Inventory Database (TWBID) 2.1, Data Version D.4.16 (LANL-CO 2005). In order to address this comment, the un-scaled density values from ATWIR – 2008 were multiplied by the total (stored + projected + emplaced) volumes reported by the sites. The resulting masses were then used for the comparison that follows. In this way a comparison can be made on the amount of iron-based metals and cellulose, plastic and rubber (CPR) reported over the five year period of interest.

Iron-based Metals

Table 2 shows the differences between the iron-based metal reported in TWBIR-2004 and the ATWIR-2008. There was a total mass decrease in iron-based metal of 5,643,200 kg with the Hanford site accounting for 98% of this total decrease. Hanford's total decrease is 5,509,300 kg, primarily from three waste streams: RL-231Z-01 (447,900 kg), RLPFP-01 (3,139,000 kg), and RLPURX-05 (462,700 kg). The RL-231-01, RLPFP-01 and RLPURX-05 waste streams were characterized in the timeframe between the two reports and were in the process of being emplaced at the timeframe of the ATWIR-2008. The significant decrease in these waste streams is due to reevaluation of the estimated inventory remaining on site based on characterization data obtained over the five year period of interest.

Table 2 - Difference for Iron-based Metals between the CRA-2004 PABC and CRA-2009 PABC

TRU Waste Site	TWBIR-2004	ATWIR-2008	Decrease
Hanford	7,476,000 kg	1,966,700 kg	5,509,300 kg
All Other Sites	9,288,400 kg	9,154,500 kg	133,900 kg
Total	**16,764,400 kg**	**11,112,200 kg**	**5,643,200 kg**

Cellulose, Plastic and Rubber

Table 3 shows there was a total decrease of 3,055,600 kg in the mass of cellulose from TWBIR-2004 to the ATWIR-2008 inventory. Of this decrease, 77% of the decrease in cellulose is accounted for at Idaho National Laboratory (INL). During the TWBIR-2004 timeframe, IN-BN510 was the major waste stream at INL. During the ATWIR-2008 data collection timeframe, IN-BN510 was divided into several different waste streams and reassessed based on new acceptable knowledge (AK) and characterization data. This resulted in a decrease for the IN-BN510 waste stream of 3,705,400 kg. This decrease was offset by changes in other INL waste streams with the largest change being an increase reported for the Idaho Cleanup Project of 800,400 kg. The net result was a 2,344,500 kg decrease at INL as shown in Table 3.

Table 3 - Differences for Cellulose between the CRA-2004 PABC and CRA-2009 PABC

TRU Waste Site	TWBIR-2004	ATWIR-2008	Decrease
INL	6,790,300 kg	4,445,800 kg	2,344,500 kg
All Other Sites	1,689,000 kg	977,900 kg	711,100 kg
Total	**8,479,300 kg**	**5,423,700 kg**	**3,055,600 kg**

Another reason for differences in cellulose reported between the TWBIR-2004 and ATWIR-2008 resulted from changes in how cellulose was reported after the TWBIR-2004 was published.

During the timeframe leading up to and including the TWBIR-2004, cellulose was only tracked as a waste material parameter. After 2004, cellulose was tracked in the WIPP Waste Information System (WWIS) as both a waste material parameter and a packaging material parameter. This change in waste material and waste packaging reporting affected how cellulose in emplaced waste streams was reported. In ATWIR-2008, a decrease of 555,400 kg for cellulose waste material, as reported by Rocky Flats Environmental Site, was offset with an increase of approximately the same mass for cellulose packaging materials (605,600 kg) reported in the total emplaced inventory.

Table 4 shows the total decrease for plastic between TWBIR-2004 and the ATWIR-2008 was 1,244,200 kg with INL being the main contributor to this decrease. INL plastic decreased by 1,768,300 kg with 99.8% of this decrease attributed to changes in IN-BN510 for the same reason stated above. Los Alamos National Laboratory (LANL) and Savannah River Site (SRS) both had increases in their plastic mass for this same time period. LANL's plastic increased by 300,000 kg and SRS increased by 380,600 kg. This plastic increase was due to the reassignment and associated reassessment of waste placed into different waste streams based on new AK and characterization data. During this reassessment, it was determined that LANL and SRS had underestimated the amount of plastic reported in the TWBIR – 2004 inventory by the amount shown in Table 4.

Table 4 - Differences for Plastic between the CRA-2004 and CRA-2009 PABC

TRU Waste Site	TWBIR-2004	ATWIR-2008	Decrease	Increase
INL	4,847,900 kg	3,079,600 kg	1,768,300 kg	
LANL	164,200 kg	464,200 kg		300,000 kg
SRS	226,300 kg	606,900 kg		380,600 kg
All Other Sites	1,234,700 kg	1,078,200 kg	156,500 kg	
Total	**6,473,100 kg**	**5,228,900 kg**	**1,244,200 kg** [1]	

[1] Value reported is sum of decreases minus increases.

Table 5 shows the total decrease for rubber was 1,251,200 kg between TWBIR-2004 and the ATWIR-2008 due to reassignment of waste and reassessment of remaining legacy waste streams based on new AK and characterization data. INL rubber decreased for the same reason that the cellulose and plastic decreased. The total decreased for INL was 1,322,500 kg with IN-BN510 being the main contributor to the decrease. Rubber increased 61,000 kg at LANL and 76,400 at SRS for the same reason that the plastic increased.

Table 5 - Differences for Rubber between the CRA-2004 PABC and CRA-2009 PABC

TRU Waste Site	TWBIR-2004	ATWIR-2008	Decrease	Increase
INL	1,589,400 kg	266,800 kg	1,322,500 kg	
LANL	24,300 kg	85,300 kg		61,000 kg
SRS	45,800 kg	122,300 kg		76,400 kg
All Other Sites	360,100 kg	294,000 kg	66,100 kg	
Total	**2,019,600 kg**	**768,400 kg**	**1,251,200 kg** [1]	

[1] Value reported is sum of decreases minus increases.

References

Crawford, B.A., Guerin, D., Lott, S.A., McInroy, B., McTaggart, J., and VanSoest, G., 2009, *Performance Assessment Inventory Report – 2008.* INV-PA-08, Revision 0, LA-UR-09-02260. Carlsbad, NM: Los Alamos National Laboratory – Carlsbad Operations.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2005. Transuranic Waste Baseline Inventory Database, Rev. 2.1, Version 3.13, Data Version D.4.16. Carlsbad, NM: Los Alamos National Laboratory – Carlsbad Operations.

Los Alamos National Laboratory – Carlsbad Operations (LANL-CO) 2008. *Comprehensive Inventory Database, Version 1.00, Schema Version 1.00, Data Version D.7.00.* Carlsbad, NM: Los Alamos National Laboratory-Carlsbad Operations.

U. S. Department of Energy (DOE) 2006. *Transuranic Waste Baseline Inventory Report - 2004*, DOE/TRU-2006-3344, Revision 0. Carlsbad, NM: Carlsbad Field Office.

U.S. Department of Energy (DOE) 2008. *Annual Transuranic Waste Inventory Report – 2008*, DOE/TRU-2008-3425, Revision 0 (December). Carlsbad, NM: Carlsbad Field Office.

EPA Comment

3-C-25

The K_d values used to model matrix actinide sorption during transport through the Culebra were based on the consideration of experimental data for low to intermediate organic ligand concentrations (Brush and Storz 1996). However, since the time of the CCA when these parameters were evaluated, predicted organic ligand concentrations in repository brines have increased significantly. Current predicted maximum acetate and citrate repository brine concentrations are now comparable to the high organic ligand concentrations used in the K_d experiments, and the predicted maximum EDTA concentration in repository brine now exceeds the highest concentrations used in the organic ligand K_d experiments (Brush and Storz 1996). Because the experimental K_d values reported for the III and IV actinides with high organic ligand concentrations are smaller than the K_d ranges used in the CRA-2009 PA (see Table below), and the importance of americium(III), plutonium(III), and plutonium(IV) to total releases from the repository, the increased concentration of organic ligands indicates that the K_ds used in the CRA-2009 are potentially too high and overestimate the potential retardation in the Culebra. Please defend the use of the higher K_ds in light of the much higher organic ligand concentrations.

Actinide Oxidation State	CRA-2004 PA and PABC and CRA-2009 PA and PABC PAVT K_d Range [m^3kg] (Brush and Storz 1996)	K_d Range, High Concentration Organics [m^3kg] (Brush and Storz 1996)
Americium (III)	0.02 – 0.4	0.00505 – 0.00740
Plutonium (III)	0.02 – 0.4	--
Uranium (IV)	0.7 – 10	--
Neptunium (IV)	0.7 – 10	--
Thorium (IV)	0.7 – 10	0.000467 – 0.00469
Plutonium (V)	0.7 – 10	--
Neptunium (V)	0.001 – 0.2	0.00 – 0.00249
Uranium (VI)	0.00003 – 0.02	0.00 – 0.0101

EPA References

Brush, L.H. and L.J. Storz. 1996. *Revised Ranges and Probability Distributions of K_ds for Dissolved Pu, Am, U, Th and Np in the Culebra for the PA calculations to Support the WIPP CCA*. ERMS 241561. Albuquerque, NM: Sandia National Laboratories.

DOE Response

The EPA is correct in pointing out that the predicted maximum organic ligand concentrations have increased significantly since the CCA. The predicted maximum organic ligand concentration is conservatively calculated using a small volume of brine (Clayton 2008). For the hypothetical scenario where contaminated brine flows out of the repository, it would first mix with more brine from the Salado, as well as brine from the Castile Formation. If it reached and traveled through the Culebra, it would also mix with the Culebra brine. Mixing with these brines dilutes the organic ligand concentrations.

In order to incorporate the possible effect of the higher predicted maximum organic ligand concentrations, the K_d ranges of the modeled actinides will be expanded, such that the lower bounds are reduced to the values in Tables G-3 and G-7 in Brush and Storz (1996) for high concentration organics. The upper bound of the K_d ranges will be maintained. The determination of the updated K_d ranges (see Table below) is discussed in Clayton (2009) and will be used in the CRA-2009 PABC.

Table 1. K_d Ranges to be used in the CRA-2009 PABC

Actinide Oxidation State	K_d Range
Americium(III)	0.005 - 0.4
Plutonium(III)	0.005 - 0.4
Uranium(IV)	0.0005 - 10
Neptunium(IV)	0.0005 - 10
Thorium(IV)	0.0005 - 10
Plutonium(IV)	0.0005 - 10
Neptunium(V)	0.00003 - 0.2
Uranium(VI)	0.00003 - 0.02

References

Brush, L.H. and L.J. Storz. 1996. *Revised Ranges and Probability Distributions of K_ds for Dissolved Pu, Am, U, Th and Np in the Culebra for the PA calculations to Support the WIPP CCA*. ERMS 241561. Albuquerque, NM: Sandia National Laboratories.

Clayton, D.J. 2008. *Update to the Calculation of the Minimum Brine Volume for a Direct Brine Release*. ERMS 548522. Carlsbad, NM: Sandia National Laboratories.

Clayton, D.J. 2009. *Update to the K_d values for the PABC-2009*. ERMS 552395. Carlsbad, NM: Sandia National Laboratories.

EPA Comment

3-23-8 FEPs (194.23)

The screening argument for FEP W45 is combined with that for FEPs W44 (Degradation of Organic Material) and W48 (Effects of Biofilms on Microbial Gas Generation), and is presented in Section 2.2.3.9 of Kirkes 2008 [ERMS 550489]. The screening argument for these three FEPs was changed to reflect repository inventory changes in non-radioactive materials that result in increased heat generation from exothermic chemical reactions. Although these three FEPs have been appropriately screened in and gas generation due to microbial activity is included in PA, EPA believes that the updated screening argument does not adequately demonstrate that the microbial gas generation models used in PA remain appropriate under the increased repository temperatures. The screening argument identifies the reference temperature under which the gas generation experiments were carried out (30°C), but does not present or discuss comparative information on the new average repository temperature resulting from the inventory changes. The argument states that increases in temperature from ambient up to 40°C or 50°C have been reported to increase gas production. The argument's concluding assertion that"...the effects of temperature on microbial gas generation are implicitly incorporated in the gas generation rates used" is not adequately supported. With the exception of FEP W45, EPA concurs with DOE's screening argument changes and conclusions reached. DOE needs to better support conclusions related to FEP W45.

EPA References

Kirkes, G.R. 2008. *Features, Events and Processes Assessment for the Compliance Recertification Application—2009 (Revision 0)*. ERMS 550489. Carlsbad, NM: Sandia National Laboratories.

DOE Response

The expected temperature in the WIPP repository remains unchanged from that used in the Compliance Certification Application (DOE 1996). The waste inventory used for the CRA-2009 supports this conclusion as shown in Table 3-23-8.1. Experimental work by Molecke (1979) describes the effect of increased temperature on the microbial gas-generation rates. Molecke's work evaluated gas-generation rates over a range of temperatures, including those significantly higher than expected in the WIPP (up to 70°C [158°F]). The screening argument for FEP W45 describes the experiments conducted by Molecke (1979) however Molecke's work is not a prediction of WIPP repository temperatures. WIPP performance assessment calculations use an expected repository temperature of 27°C (80.6°F) (Appendix SOTERM 2.2.2 "Repository Temperature").

Table 3-23-8.1 shows the localized and transient potential temperature increases due to exothermic reactions as reported in Appendix SCR for the Compliance Certification Application

(CCA), the Compliance Recertification Application – 2004 (CRA–2004), and the CRA–2009, respectively. As shown below, the thermal rise caused by inventory components used for the CRA–2009 actually results in a temperature decrease from that used in the CRA–2004.

Table 3-23-8.1. Maximum-Transient-Potential Thermal Rise in WIPP Due to Exothermic Reactions[1]

	Increase due to Backfill Hydration	Increase due to Aluminum Corrosion	Increases from All Exothermic Reactions Assumed to Occur Simultaneously[2]
CCA	< 5°C (9°F)	6°C (10.8°F)	< 6°C (10.8°F)
CRA–2004	5.3°C (9.5°F)	7.9°C (14.2°F)	< 10°C (18°F)
CRA–2009	< 4.2°C (7.6°F)	6.9°C (12.4°F)	< 10°C (18°F)

1. See CCA, Appendix SCR; CRA-2004, Appendix PA, Attachment SCR; and CRA-2009, Appendix SCR.
2. Total temperature increases from all thermodynamic reactions are limited by overall brine availability.

The DOE believes the current gas-generation rates in PA adequately reflect temperature uncertainty. The microbial gas-generation rates currently implemented in PA have a minimum of one order of magnitude uncertainty in the distributions sampled. This is comparable to the order of magnitude uncertainty in rates observed by Molecke (1979) over different temperatures. Given the short-term transient nature of any rise in temperature due to exothermic reactions, and the current uncertainty distributions assigned to microbial-gas-generation rates, DOE believes the current implementation adequately encompasses uncertainty due to temperature effects.

References

Francis, A.J., and J.B. Gillow. 1994. *Effects of Microbial Processes on Gas Generation Under Expected Waste Isolation Pilot Plant Repository Conditions. Progress Report through 1992.* SAND93-7036. ERMS 210673. Albuquerque, NM: Sandia National Laboratories.

Molecke, M.A. 1979. *Gas Generation from Transuranic Waste Degradation.* SAND79-0911C. ERMS 228093. Albuquerque, NM: Sandia National Laboratories.

EPA Comment

3-23-10

The focus of EPA's review of the CRA09 input files was on changes that occurred since the PABC 2004. Identified changes involving hard-coded numerical inputs included both run control parameters and parameters that EPA recommends drawing from the parameter database (PAPDB). Parameters recommended as drawing from the PAPDB instead of hard-coding include those with the potential to be changed, for example when implementing sensitivity studies, and those for which references to supporting documentation is desirable. Referencing supporting documentation is an integral part of the PAPDB and is readily traceable. Referencing supporting documentation can be accomplished as comments within a code, but is not an integral part of a code and is not as readily traceable. The parameters identified in EPA's review of the CRA09 input files as recommended for incorporation into the PAPDB are summarized in the following tabulation. EPA recommends that DOE incorporate these parameters into the PAPDB.

CRA09 Hard Coded Inputs Recommended for Incorporation in the PAPDB

Input File	Code	Parameter Value	Parameter Type
ALGEBRA1	BRAGFLO	1.7	Factor converting mass of plastic to equivalent mass of cellulosics.
ALGEBRA1	BRAGFLO	1.0	Moles of CO_2 produced per mole of organic carbon [SMIC_CO2]
ALGEBRA1	BRAGFLO	1.05	Factor to calculate minimum brine saturation when using capillary pressure Model 3
PREBRAG	BRAGFLO	101325.0	Preclosure brine pressure for Cavities 1 through 4 [PRES_BRINE]
PREBRAG	BRAGFLO	0.0	Preclosure brine saturation for Cavities 1 through 4 [SAT_BRINE]
PREBRAG	BRAGFLO	1.5000E-02	Minimum brine saturation cutoff for the waste area [SOCMIN]
PREBRAG	BRAGFLO	1.0E-2	Tolerance for relative permeability Model 11 to prevent singularities when calculating capillary pressure at low saturations [TOL]
PREBRAG	BRAGFLO	1.0E-03	Tolerance for relative permeability Model 12 to prevent singularities when calculating capillary pressure at low saturations [SOCEFFMIN]
ALGEBRA2	BRAGFLO DBR	1.05	Factor to calculate minimum brine saturation when using capillary pressure Model 3
ALGEBRA2	BRAGFLO DBR	32.1	Panel closure dimension -length of the open drift and explosion wall [D1]
ALGEBRA2	BRAGFLO_DBR	7.9	Panel closure dimension - length of the concrete panel closure [D2]
ALGEBRA2	BRAGFLO DBR	40.0	Panel closure dimension - total length [DE]
PREBRAG	BRAGFLO_DBR	3.888E5	Maximum time for uncontrolled intrusion borehole flow [TIME]

DOE Response

As discussed in *Analysis Plan for the CRA-2009 Performance Assessment Baseline Calculation, AP-145* (Clayton 2009, Section 2.1.5), a review of the performance assessment (PA) input files has been conducted in preparation for the Compliance Recertification Application - 2009 Performance Assessment Baseline Calculation (PABC-2009). One aspect of the review is to remove the hand-entered numerical values from the input files and to reference the correct parameters from the parameter database (PAPDB, Tisinger 2002), where appropriate. As a result of the review, four of the values shown in the EPA table resulted in the creation of new parameters in Table 3-23-10.1. Many other numerical values have been changed in the input files to reference an already existing parameter in the PAPDB. The documentation of the results of the input file review will be contained in the analysis packages of the PABC-2009.

Five of the values in EPA's table are code control or configuration parameters. Code control or configuration parameters are used primarily for the purposes of: grid cell dimensions and elevations; numerical control (such as the tolerance limit to determine convergence); model control (such as the specific tolerances for capillary pressure model); and output control (which determines the data to be written in code output files). Code control or configuration parameters are contained in the input files for each code and are not appropriate for the PAPDB. Since the input files are archived, all code control and configuration parameters are always available for review by the EPA.

Table 3-23-10.1 summarizes the resolution for the numerical values listed in EPA's table.

Table 1- 3-23-10.1- Resolutions of CRA09 Hard Coded Inputs

Input File	Code	Value	Parameter	Resolution
ALGEBRA1	BRAGFLO	1.7	REFCON:PLASFAC*	Added to PAPDB
ALGEBRA1	BRAGFLO	1.0	WAS_AREA:SMIC_CO2*	Added to PAPDB
ALGEBRA1	BRAGFLO	1.05	-	Code configuration parameter, not added to PAPDB
PREBRAG	BRAGFLO	101325	BRINESAL:REF_PRES	Changed input file to reference existing parameter
PREBRAG	BRAGFLO	0.0	CAVITY_1:SAT_IBRN, CAVITY_2:SAT_IBRN, CAVITY_3:SAT_IBRN, CAVITY_4:SAT_IBRN	Changed input file to reference existing parameters.
PREBRAG	BRAGFLO	1.5E-02	-	Code configuration parameter, not added to PAPDB
PREBRAG	BRAGFLO	1.0E-02	-	Code configuration parameter, not added to PAPDB
PREBRAG	BRAGFLO	1.0E-03	-	Code configuration parameter, not added to PAPDB
ALGEBRA2	BRAGFLO_DBR	1.05	-	Code configuration parameter, not added to PAPDB
ALGEBRA2	BRAGFLO_DBR	32.1	CONC_PCS:THKOPEN*	Added to PAPDB
ALGEBRA2	BRAGFLO_DBR	7.9	CONC_PCS:THKCONC*	Added to PAPDB
ALGEBRA2	BRAGFLO_DBR	40.0	-	Modified the input file to calculate this value from the sum of CONC_PCS:THKOPEN and CONC_PCS:THKCONC.
PREBRAG	BRAGFLO_DBR	3.88E05	BLOWOUT:MAXFLOW	Although the parameter exists in the PAPDB, PREBRAG version 8.0 only accepts numerical inputs for this output control parameter, and hence the numerical value was maintained in the input file.

*New parameter

References

Clayton, D.J. 2009. *Analysis Plan for the CRA-2009 Performance Assessment Baseline Calculation.* AP-145. Carlsbad, NM: Sandia National Laboratories.

Tisinger, S.R. 2002. *Software and Installation and Checkout Form for PAPDB, Version 1.00.* ERMS 518619. Carlsbad, NM: Sandia National Laboratories.

EPA Comment

3-23-11

Appendix PA-2009 states in Section PA-4.2.2, Initial Conditions, last paragraph, that the initial waste disposal area pressure is 1.01325 x 10^5 Pa, rather than the value of 1.28039 x 10^5 Pa used in the 2004 Performance Assessment Baseline Calculation (PABC04). In PABC04 DOE used a new initial waste disposal area pressure that combines atmospheric pressure (1.01325 x 10^5 Pa) and total initial gas generated (26.714 x 10^3 Pa) to account for the initial state of the two stage microbial gas generation exhibited in long-term gas generation experiments. It appears that ERMS 540527, Analysis Package for BRAGFLO for PABC04, documents the correct value in Section 5.5. EPA searched throughout the CRA09 documentation and could only find the correct value in this secondary documentation. DOE should correct these errors and assure that the performance assessment uses the correct value.

EPA References

Nemer, M.B. and J.S. Stein. 2005. *Analysis Package for BRAGFLO, 2004 Compliance Recertification Application Performance Assessment Baseline Calculation* (June 28). ERMS 540527. Carlsbad, NM: Sandia National Laboratories.

DOE Response

The initial waste disposal area pressure is 1.28039×10^5 Pa in the BRAGFLO calculations for the performance assessment for CRA-2009 and this remains unchanged from the CRA-2004 PABC. The DOE has confirmed this value by checking the BRAGFLO input files, so the error is in the documentation in Appendix PA, not in the performance assessment calculations. The error in the initial pressure reported in Section PA-4.2.2 will be corrected as follows:

Section PA-4.2.2, Last Paragraph, Last Two Sentences, will be changed to read:

In the waste disposal regions (areas Waste Panel, South RoR, and North RoR), P_b(x, y, 0) = 1.28039×10^5 Pa and S_g(x, y, 0) = 0.985 (see WAS_AREA:SAT_IBRN). The initial pressure in the waste disposal regions is greater than atmospheric pressure (1.01325×10^5 Pa) to account for the incremental pressure generated by faster initial microbial gas generation rates observed during laboratory experiments (Nemer and Stein 2005, Sections 3.2 and 5.5.2). In the other excavated areas, $P_b(x, y, 0) = 1.01325 \times 10^5$ Pa and $S_g(x, y, 0) = 1.0$. The value of initial pressure in the waste disposal regions is identical with that used in the CRA-2004 PABC (Leigh et al. 2005, Section 2.3).

This text will be added to the errata list for Appendix PA.

References

Leigh, C., J. Kanney, L. Brush, J. Garner, G. Kirkes, T. Lowry, M. Nemer, J. Stein, E. Vugrin, S. Wagner, and T. Kirchner. 2005. *2004 Compliance Recertification Application Performance Assessment Baseline Calculation* (Revision 0). ERMS 541521. Carlsbad, NM: Sandia National Laboratories.

Nemer, M.B. and J.S. Stein. 2005. *Analysis Package for BRAGFLO, 2004 Compliance Recertification Application Performance Assessment Baseline Calculation* (June 28). ERMS 540527. Carlsbad, NM: Sandia National Laboratories.

EPA Comment

3-23-12 Computer Codes

A number of secondary computer codes are used to support CRA-2009. Please provide QA documentation for these codes that demonstrate they are reasonably qualified for use in PA. These secondary computer codes include (but are not limited to); SigmaPlot, VARIOWIN, KT3D, PERL Script, nSights, Matlab, VarioWin, Kaleidagraph, GMS, MVS, Mathcad, and ARCInfo.

Response

Other than nSights and KT3D (full documentation provided in Enclosure 2) the subject codes are acquired Commercial Off The Shelf Software (COTS) applications and are exempt from the standard NQA 2.7 lifecycle documentation requirements for developed software (U.S. DOE 2009 and Chavez 2006). Other types of COTS software include Microsoft® Excel®, Techplot, Surfer®, Grapher®, Mathematica®, Microsoft® Access®, Microsoft® SQL Server 2000®, MySQL®, Perl®, Python® etc. Most of these software applications are self explanatory (e.g., graphing software, statistical analysis software, database, scripting languages, etc.). However, the use of these types of commercial applications is governed by NP 9-1 Appendix C (Chavez 2009) for routine calculations which require sufficient documentation detail to allow reproducibility by an independent technical person. As with numerical modeling software routine calculations are dependent on the analysis for which they are being used and are documented with their respective analysis reports.

References

Chavez, M., (2006) Nuclear Waste Management Procedure NP 19-1 Software Requirements, Revision 12, pp. 7-8, Section 2.2.1, June 21, 2006, ERMS 543746. Carlsbad, NM: Sandia National Laboratories. Available at http://www.nwmp.sandia.gov/onlinedocuments/nwmp/np/np1901.pdf

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