Alicia Mullins

From: Osvaldo Pensado
Sent: Tuesday, February 27, 2007 10:22 AM
To: Tae Ahn
Cc: David Pickett
Subject: Glass parameters
Attachments: TPA_Parameters_Chapter10_ENG4 02-26-07_OPR.xls

Follow Up Flag: Follow up
Flag Status: Flagged

Tae, these are the glass parameters. See some draft justification in the attachment (browse untill the end of the file).

SurfaceAreaOfGlass[m^2/kg]

LogOfGlassDissolutionConstantHighRange[]

pHParameterHighRange[]

GlassActivationEnergyHighRange[kJ/mol-K]

LogOfGlassDissolutionConstantLowRange[]

pHParameterLowRange[]

GlassActivationEnergyLowRange[kJ/mol-K]

pHForGlassModel[]

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Properties Page

Return-path: <opensado@cnwra.swri.edu>
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dpickett@cnwra.swri.edu; Tue, 27 Feb 2007 09:22:12 -0600 (CST)
Date: Tue, 27 Feb 2007 09:22:11 -0600
From: Osvaldo Pensado <opensado@cnwra.swri.edu>
Subject: Glass parameters
To: Tae Ahn <tma@nrc.gov>
Cc: David Pickett <dpickett@cnwra.swri.edu>
Reply-to: opensado@cnwra.swri.edu
Message-id: <016901c75a83$0db8d0e0$d4c8a281@cnwra.swri.edu>
Organization: CNWRA
MIME-version: 1.0
X-MIMEOLE: Produced By Microsoft MimeOLE V6.00.2900.3028
X-Mailer: Microsoft Outlook, Build 10.0.6626
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boundary="----=_NextPart_000_016A_01C75A50.C31E60E0"
Importance: Normal
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X-MSMail-priority: Normal
Original-recipient: rfc822;dpickett@cnwra.swri.edu

Name	Description	PDF Type	Value(s)	Justification		Contact	TPA Section	ISI Lead	User Guide Chapter#
PermanentLossColloidFilterFactor_Invert_Ja[]	The proportion of americium irreversibly attached to colloids that is permanently removed by filtration in the invert	constant	0.0	Assigned artificial values so as to eliminate any filtering of colloids by the invert. Conservative assumption consistent with DOE approach (*EBS Radionuclide Transport Abstraction* , ANL-WIS-PA-000001 Rev 02, 2005) and based in part on analyses in Bechtel SAIC Company, LLC (2003) *Technical Basis Document No. 8: Colloids*. Revision 2. Las Vegas, NV: Bechtel SAIC Company, LLC, and Rechard, R.P., L.C. Sanchez, and H.R. Trellue (2003) Consideration of nuclear criticality when directly disposing highly enriched spent nuclear fuel in unsaturated tuff–II: Geochemical constraints. *Nuclear Technology* 144: 222-251.		D. Pickett	EBSFILT	ENG4	10
PermanentLossColloidFilterFactor_Invert_Jc[]	The proportion of curium irreversibly attached to colloids that is permanently removed by filtration in the invert	constant	0.0	Same as PermanentLossColloidFilterFactor_Invert_Ja[]		D. Pickett	EBSFILT	ENG4	10
PermanentLossColloidFilterFactor_Invert_Jp[]	The proportion of plutonium irreversibly attached to colloids that is permanently removed by filtration in the invert	constant	0.0	Same as PermanentLossColloidFilterFactor_Invert_Ja[]		D. Pickett	EBSFILT	ENG4	10
PermanentLossColloidFilterFactor_Invert_Jt[]	The proportion of thorium irreversibly attached to colloids that is permanently removed by filtration in the invert	constant	0.0	Same as PermanentLossColloidFilterFactor_Invert_Ja[]		D. Pickett	EBSFILT	ENG4	10
InvertThickness[m]	Invert thickness (m)	constant	0.606	Maximum thickness of invert, as described in the DOE EBS Transport Abstraction (Bechtel SAIC Company, LLC, 2001a).	(J. Winterle: 5/3/05) (Checked by J. Winterle, 2/6/07)	D. Pickett	EBSFILT	ENG4	10
InvertDiffusionCoefficient[m^2/yr]	Diffusion coefficient for the invert (m2/yr)	constant	3.0e-3	Molecular self-diffusion for water at 25C (2.3E-5 cm2/s), reduced to account for saturated porosity of (0.1) and tortuosity factor of (0.4).	(J. Winterle: 5/3/05) (Checked by J. Winterle, 2/6/07)	D. Pickett	EBSFILT	ENG4	10
InvertBypass(0=ebsfilt,1=bypass-ebsfilt)	Flag for selecting whether to perform calculations for transport through the invert. A value of 1 indicates that the transport through invert is skipped	iflag	1	User option. Program control switch to investigate effects of the invert. Default value bypasses invert model, which is currently the preferred approach.	(R. Fedors: 5/20/05) (O. Pensado: SCR 626) (Checked by J. Winterle, 2/6/07)	D. Pickett	EBSFILT	ENG4	10

InvertRockPorosity	Porosity of the invert	constant	0.13	The aggregate that is currently slated to be used for the invert is derived from the host rock. Flow through the invert could occur by intergranular or intragranular pathways. Because low flow rates are expected from the waste package and beneath the drip shield, the matrix porosity and permeability of the invert should reflect that of the host rock, not the intergranular space between the host rock cobble and gravel sized fragments. At high flow rates, the intergranular space in the invert will dominate flow, but the TPA Version 5.0 bypasses (time-wise and radionuclide sorption-wise) the invert if the flux is greater than the invert permeability. Hence, at most expected water flux rates to the invert, the matrix of the grains will control the transport, otherwise, bypassing occurs. The value of 0.13 (Flint, 1998) reflects the average porosity of the most common host rock material, the Topopah Springs lower lithophysal unit.	(R. Fedors: 5/20/05) (Checked by J. Winterle, 2/6/07)	D. Pickett	EBSFILT	ENG4	10
InvertMatrixPermeability[m^2]	Matrix permeability of the invert (m2)	constant	7e-18	The aggregate that is currently slated to be used for the invert is derived from the host rock. If flux is greater than the specified invert matrix permeability, TPA Version 5.1 bypasses invert transport and radionuclides directly enter the UZ as though the intragranular porosity of the invert were part of the UZ fracture network. The value of 7e-18 m^2 reflects the approximate average permeability of the Topopah Springs lower lithophysal unit rock matrix reported by Flint (1998). Note also that this parameter is not used when InvertBypass(0=ebsfilt,1=bypass-ebsfilt) is set to the reference case value of 1.	(J. Winterle: 2/6/07)	D. Pickett	EBSFILT	ENG4	10
IrreversibleColloidModel[0=no ,1=yes]	Program switch to control the introduction of irreversible redionuclides into the ground water transport models. (0 = no colloids are introduced; 1 = colloids are introduced.)	iconstant	1	Default value enables irreversible colloid model, which is currently the preferred approach.	(R. Janetzke: 5/23/05)	D. Pickett	EBSFILT	ENG4	10
WastePackageFlowMultiplicationFactor	Factor that is multiplied by the flow rate hitting a WP. The resulting flow rates are written to ebsflo.dat which is an input file to the releaset.f stand-alone code.	constant	1.0		(O. Pensado R. Fedors SCR 608);		EBSFILT	ENG4	10

NegativeLog10CarbonateConcentration[mol/L]	Negative log10 of carbonate concentration (mol/L) in water in contact with spent fuel	constant	2.7	Upper bound, from equilibrium calculation at 25C (Technical Basis Document No. 7, Rev 01, Eqn 3-16) using DOE upper bounds of fCO2 = 0.01 bar (ANL-EBS-MD-000033 Rev 02) and pH = 7.0 (Technical Basis Document No. 7, Rev 01). Scientific notebook 172, pp. 81-83.	Verify Ref is in Reference list	D. Pickett	EBSREL	ENG4	10
RD_Invert_Cm	Retardation factor of Cm in invert	beta	2001, 20001, 9.039, 18.079	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=2001, max=20001, E[x]=8001, COV=s.d./E[x]=0.20		D. Pickett	EBSREL	ENG4	10
RD_Invert_Pu	Retardation factor of Pu in invert	uniform	min = 101, max = 1401	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls		D. Pickett	EBSREL	ENG4	10
RD_Invert_U	Retardation factor of U in invert	beta	1, 21, 4.091, 4.091	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=1, max=21, E[x]=11, COV=s.d./E[x]=0.30		D. Pickett	EBSREL	ENG4	10
RD_Invert_Am	Retardation factor of Am in invert	beta	2001, 20001, 9.039, 18.079	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=2001, max=20001, E[x]=8001, COV=s.d./E[x]=0.20		D. Pickett	EBSREL	ENG4	10
RD_Invert_Np	Retardation factor of Np in invert	beta	1, 21, 4.091, 4.091	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=1, max=21, E[x]=11, COV=s.d./E[x]=0.30		D. Pickett	EBSREL	ENG4	10
RD_Invert_Th	Retardation factor of Th in invert	beta	2001, 20001, 9.039, 18.079	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=2001, max=20001, E[x]=8001, COV=s.d./E[x]=0.20		D. Pickett	EBSREL	ENG4	10
RD_Invert_Ra	Retardation factor of Ra in invert	uniform	min = 1001, max = 2001	Same as RD_Invert_Pu		D. Pickett	EBSREL	ENG4	10
RD_Invert_Pb	Retardation factor of Pb in invert	uniform	min = 2001, max = 10001	Same as RD_Invert_Pu		D. Pickett	EBSREL	ENG4	10
RD_Invert_Cs	Retardation factor of Cs in invert	uniform	min = 201, max = 2001	Same as RD_Invert_Pu		D. Pickett	EBSREL	ENG4	10

RD_Invert_I	Retardation factor of I in invert	constant	1.0	Same as RD_Invert_Pu	D. Pickett	EBSREL	ENG4	10
RD_Invert_Tc	Retardation factor of Tc in invert	constant	1.0	Same as RD_Invert_Pu	D. Pickett	EBSREL	ENG4	10
RD_Invert_Ni	Retardation factor of Ni in invert	beta	1, 1001, 3.061, 2.041	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=1, max=1001, E[x]=601, COV=s.d./E[x]=0.33	D. Pickett	EBSREL	ENG4	10
RD_Invert_Cl	Retardation factor of Cl in invert	constant	1.0	Same as RD_Invert_Pu	D. Pickett	EBSREL	ENG4	10
RD_Invert_Se	Retardation factor of Se in invert	beta(exp)	1, 21, 4.091, 4.091	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=1, max=21, E[x]=11, COV=s.d./E[x]=0.30	D. Pickett	EBSREL	ENG4	10
RD_Invert_Nb	Retardation factor of Nb in invert	beta	2001, 20001, 9.039, 18.079	Table 2a of CRWMS M&O (2002) (UZ and SZ Flow and Transport Properties - U0100). Most conservative tuff values used. Calculations recorded in Excel file Sorption_parameters_TPA5_Turner.xls min=2001, max=20001, E[x]=8001, COV=s.d./E[x]=0.20	D. Pickett	EBSREL	ENG4	10
SorptionCapacity[moles/m3]	Maximum allowable moles of plutonium and americium attached irreversibly to steel corrosion product colloids	usersupplied pwisecdf	7.37E-06, 0 9.45E-05, 0.05 1.93E-04, 0.1 2.84E-04, 0.15 3.76E-04, 0.2 4.63E-04, 0.25 5.49E-04, 0.3 6.39E-04, 0.35 7.49E-04, 0.4 8.69E-04, 0.45 1.03E-03, 0.5 1.23E-03, 0.55 1.50E-03, 0.6 1.76E-03, 0.65 2.09E-03, 0.7 2.49E-03, 0.75 3.04E-03, 0.8 3.73E-03, 0.85 4.53E-03, 0.9 5.97E-03, 0.95 1.10E-02, 1	Calculated from distibutions for corrosion product colloid concentration and specific surface area. Based on DOE data (MDL-EBS-PA-000004 Rev 02), adjusted to account for elimination of carbon steel from CSNF waste canister design (DOE/RW-0585, Rev B). Documented in scientific notebooks 133 and 318E.	S. Painter	EBSREL	ENG4	10
AffinityFactorAm		uniform	5.0, 15.0		S. Painter	EBSREL	ENG4	10
AffinityFactorCm		uniform	5.0, 15.0		S. Painter	EBSREL	ENG4	10
AffinityFactorTh		uniform	5.0, 15.0		S. Painter	EBSREL	ENG4	10
AffinityFactor_U		loguniform	0.005, 0.05		S. Painter	EBSREL	ENG4	10

SolubilityAm[kg/m3]	Solubility limit for americium	uniform	2.4e-8, 2.4e-4	TRW Environmental Systems, Inc. (1995, Table 6.3-1), based on expert judgment described by Gauthier (1993), Nitsche et al. (1993) and Dyer (1993). **BG: Reevaluation recommended as uncertainties may not be convered by range.**	Re-evaluate?	D. Pickett	EBSREL	ENG4	10
SolubilityNp[kg/m3]	Spent fuel Neptunium solubility limit	loguniform	1.1e-4, 5.9e-1	TRW Environmental Systems, Inc. (1995, Table 6.3-1) and Gauthier (1993). Documented in Scientific notebook 172, pp 73-80. DOE reports used were mainly TBDoc 7, ANL-WIS-MD-000010 Rev 2 ("Dissolved Concentration Limits of Radioactive Elements,"), and ANL-EBS-MD-000033 Rev 2	Refs not in Reference list	D. Pickett	EBSREL	ENG4	10
Solubility_I[kg/m3]	Solubility limit for iodine	constant	129.0	TRW Environmental Systems, Inc. (1995), p6-7. Based on assumption that there is no solubility controlling phase for iodine (Gauthier, 1993). Conservatively assume 1.0 mol/L. **BG: QA response cites TRW only**	update Refs.	D. Pickett	EBSREL	ENG4	10
SolubilityTc[kg/m3]	Solubility limit for technetium	constant	99.3	TRW Environmental Systems, Inc. (1995), p6-7. Based on assumption that there is no solubility controlling phase for technetium (Gauthier, 1993). Conservatively assume 1.0 mol/L.		D. Pickett	EBSREL	ENG4	10
SolubilityCl[kg/m3]	Solubility limit for chlorine	constant	36.0	TRW Environmental Systems, Inc. (1995), p6-7. Based on assumption that there is no solubility controlling phase for chlorine (Gauthier, 1993). Conservatively assume 1.0 mol/L.		D. Pickett	EBSREL	ENG4	10
Solubility_U[kg/m3]	Solubility limit for uranium	logtriangular	2.4e-6, 7.6e-3, 2.4e0	TRW Environmental Safety Systems, Inc. (1995, Table 6.3-1), based on expert elicitation described in Gauthier (1993). and Wanner and Forest (1992). 1997 Sensitivity Analysis indicates low sensitivity. The maximum value of the uniform distribution (2.4e-8, 2.4e-4) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10
SolubilityCm[kg/m3]	Solubility limit for curium	uniform	2.4e-8, 2.4e-4	TRW Environmental Safety Systems, Inc. (1995, Table 6.3-1), based on expert elicitation described in Gauthier (1993). Assumed that curium behaves similarly to Am^{3+} (see Fuger, 1992). 1997 Sensitivity Analysis indicates low sensitivity. The maximum value of the uniform distribution (2.4e-8, 2.4e-4) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10

SolubilityPu[kg/m3]	Solubility limit for plutonium	usersupplied pwisecdf	23 7.11E-07, 0 3.79E-06, 0.05 6.27E-06, 0.1 8.41E-06, 0.15 1.07E-05, 0.2 1.37E-05, 0.25 1.68E-05, 0.3 2.02E-05, 0.35 2.42E-05, 0.4 2.86E-05, 0.45 3.36E-05, 0.5 4.01E-05, 0.55 4.61E-05, 0.6 5.53E-05, 0.65 6.73E-05, 0.7 8.22E-05, 0.75 1.00E-04, 0.8 1.25E-04, 0.85 1.68E-04, 0.9 2.55E-04, 0.95 3.23E-04, 0.97 5.15E-04, 0.99 1.32E-03, 1	Scientific Notebook 172, pp. 104-110 by D. Pickett and 318E by S. Painter. Based on DOE abstraction.		D. Pickett	EBSREL	ENG4	10
SolubilityTh[kg/m3]	Solubility limit for thorium	loguniform	2.3e-7, 2.3e-1	Based on sollubility data in carbonate containing systems in Osthols et al. (1994, table 3 and fig. 6) and Rai et al. (1995, fig. 1 & 3 and appendix). 1997 Sensitivity Analysis indicates low sensitivity. The mean value of the loguniform distrubution (2.3e-7, 2.3e-1) used in the sensitivity studies was chosen.	Ref not in list	D. Pickett	EBSREL	ENG4	10
SolubilityRa[kg/m3]	Solubility limit for radium	loguniform	2.3e-7, 2.3e-5, 2.3e-3	TRW Environmental Safety Systems, Inc. (1995, table 6.3-1), based on expert elicitation described in Gauthier (1993), and Kerrisk (1984). 1997 Sensitivity Analysis indicates low sensitivity. The apex of the logtriangular distribution (2.3e-7, 2.3e-3) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10
SolubilityPb[kg/m3]	Solubility limit for lead	logtriangular	2.1e-6, 6.6e-5, 2.1e-3	TRW Environmental Safety Systems, Inc. (1995, table 6.3-1), based on expert elicitation described in Gauthier (1993), Andersson (1988), and Pei-Lin et al. (1985). 1997 Sensitivity Analysis indicates low sensitivity. The apex of the logtriangular distribution (2.1e-6, 2.1e-3) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10
SolubilityCs[kg/m3]	Solubility limit for cesium	constant	135.0	Based on CNWRA assumption that there is no solubility controlling phase for cesium. Conservatively assume 1.0 mol.L.		D. Pickett	EBSREL	ENG4	10

SolubilityNi[kg/m3]	Solubility limit for nickel	logtriangular	5.9e-5, 1.1e-1, 5.9e0	TRW Environmental Safety Systems, Inc. (1995, table 6.3-1), based on expert elicitation described in Gauthier (1993), Andersson (1988), and Siegel et al. (1993). 1997 Sensitivity Analysis indicates low sensitivity. The apex of the loguniform distribution (5.9e-5, 5.9e-0) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10
SolubilitySe[kg/m3]	Solubility limit for selenium	constant	79.0	TRW Environmental Systems, Inc. (1995), p6-7. Based on assumption that there is no solubility controlling phase for selenium (Gauthier, 1993). Conservatively assume 1.0 mol/L.		D. Pickett	EBSREL	ENG4	10
SolubilityNb[kg/m3]	Solubility limit for niobium	loguniform	9.3e-8, 9.3e-6	TRW Environmental Safety Systems, Inc. (1995, table 6.3-1), based on expert elicitation described in Gauthier (1993) and Andersson (1988). 1997 Sensitivity Analysis indicates low sensitivity. The apex of the loguniform distribution (9.3e-8, 9.3e-6) used in the sensitivity studies was chosen.		D. Pickett	EBSREL	ENG4	10
WaterContactMode_Faulting(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from faulting with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP failure from faulting. Should be set consistently with SFWettedFractions.			EBSREL	ENG4	10
WeldAdvectiveFraction[] to be renamed as to be renamed as **InitialSeepageReductionFractionWeldLC**	Seepage factor to account for reduction in seepage when seepage infiltrates waste packages through welded areas	loguniform	1.0e-3, 1.0e-1		(O. Pensado SCR 626)		EBSREL	ENG4	10
WaterContactMode_Corrosion(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from general corrosion with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP failure from corrosion. Should be set consistently with SFWettedFractions.			EBSREL	ENG4	10
SubAreaWetFraction	Subarea wet fraction	uniform	0.0, 1.0				EBSREL	ENG4	10
InitialFailureTime[yr]	Failure time for initially defective WPs	constant	0.0	Value choice is arbitrary and conservative			EBSREL	ENG4	10
NumberOfSEISMOWPFailureIntervalues	Parameter not used. To be deleted	iconstant	4	User option. Best estimate of NRC/CNWRA staff but has no basis.			EBSREL	ENG4	10
BeginningOfSEISMOWPFailureInterval1[yr]	Parameter not used. To be deleted	constant	0.0	User option. There is no basis for the choice. The chosed values simply spread the failure time over a 10,000 year interval arbitrarily.			EBSREL	ENG4	10
BeginningOfSEISMOWPFailureInterval2[yr]	Parameter not used. To be deleted	constant	2000.0	User option. There is no basis for the choice. The chosed values simply spread the failure time over a 10,000 year interval arbitrarily.			EBSREL	ENG4	10
BeginningOfSEISMOWPFailureInterval3[yr]	Parameter not used. To be deleted	constant	5000.0	User option. There is no basis for the choice. The chosed values simply spread the failure time over a 10,000 year interval arbitrarily.			EBSREL	ENG4	10
BeginningOfSEISMOWPFailureInterval4[yr]	Parameter not used. To be deleted	constant	10000.0	User option. There is no basis for the choice. The chosed values simply spread the failure time over a 10,000 year interval arbitrarily.			EBSREL	ENG4	10

FlowOnsetTemperature[C]	Flow onset temperature	constant	96.0	Model assumes that there will be no water flow *into drift as long as drift temperature is above* the boiling point of water at the repository altitude			EBSREL	ENG4	10
SFDensity[kg/m3]	Spent fuel density (kg/m3)	constant	1.06e4	Data from Wilson (1990a) based on UO2	Need basis / justification.		EBSREL	ENG4	10
IModel	Selection of model for computing SF dissolution (1=absence of Ca and Si, 2=presence of Ca and Si, 3=user specified, 4=schoepite equilibrium, 5=glass model (this is not user selectable and can only be set by the TPA executive)	iconstant	2		Need Ref., basis / justification.		EBSREL	ENG4	10
OxygenPartialPressure[atm]	Oxygen partial pressure (over pressure) (atm)	constant	0.21	Data based on atmospheric composition (Stockman 1997)	Need basis / justification.	D. Pickett	EBSREL	ENG4	10
UserLeachRate[kg/yr/m2]	User-provided leaching rate (kg/yr/m2) used if IModel = 3	constant	0.0	Data based on a value for the oxidation rate at the Peña Blanca natural analog (Murphy et al., 1997) scaled to the mass of uranium in the repository, base case surface area per container, and number of containers in the repository			EBSREL	ENG4	10
CladdingCorrectionFactor	Cladding correction factor	constant	1.0	Assumes no cladding protection Tae Ahn: need to clarify need for parameter w.r.t. unzipping (w/ R. Codell & S. Mohanty)Previous value: uniform(0,1). T.Ahn: Distribution Type: on and off Parameter Values: 0.01 or 1.0 Remark: TPA's base case does not give credit to total cladding integrity. In Preexponential_SFDissolutionModel2, partial credit of failed cladding was given. In the sensitivity study, cladding integrity is tested with CladdingCorrectionFactor. As localized corrosion and stress corrosion are unlikely to occur [PRE-LICENSING EVALUATION OF AGREEMENTS CLST.3.03, CLST.3.03 AIN-1, CLST.3.04, CLST.3.04 AIN-1, CLST.3.06, CLST.3.06 AIN-1, CLST.3.07, CLST.3.08, CLST.3.08 AIN-1, CLST.3.09, CLST.3.09 AIN-1, ENFE.3.03, TSPAI.3.08, TSPAI.3.14, GEN.1.01 COMMENT 116, GEN. 1.01 COMMENT 124, U.S. DEPARTMENT OF ENERGY INITIAL RESPONSE TO GEN.1.01 COMMENT 124, AND GEN.1.01 COMMENT 126, Letter to J. D. Zigler from L. E. Kokajko, ML043490044, 2004], the only failure would be from the initial damage which has a maximum 1 % for Zirconium based (	clarify for unzipping?		EBSREL	ENG4	10

SFWettedFraction_Initial_1	SF wet fraction for initial failures in subarea 1	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_2	SF wet fraction for initial failures in subarea 2	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_3	SF wet fraction for initial failures in subarea 3	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_Initial_4	SF wet fraction for initial failures in subarea 4	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_5	SF wet fraction for initial failures in subarea 5	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_6	SF wet fraction for initial failures in subarea 6	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_Initial_7	SF wet fraction for initial failures in subarea 7	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_8	SF wet fraction for initial failures in subarea 8	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Initial_9	SF wet fraction for initial failures in subarea 9	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_Initial_10	SF wet fraction for initial failures in subarea 10	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionInitiallyDefWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_FAULTO	SF wet fraction for faulting failures	uniform	0.0, 1.0	Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_VOLCANO	SF wet fraction for volcanic failures	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Update?	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_1	SF wet fraction for seismic failures - seismic interval 1 and subarea 1	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_2	SF wet fraction for seismic failures - seismic interval 1 and subarea 2	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO1_3	SF wet fraction for seismic failures - seismic interval 1 and subarea 3	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_4	SF wet fraction for seismic failures - seismic interval 1 and subarea 4	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_5	SF wet fraction for seismic failures - seismic interval 1 and subarea 5	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO1_6	SF wet fraction for seismic failures - seismic interval 1 and subarea 6	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_7	SF wet fraction for seismic failures - seismic interval 1 and subarea 7	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_8	SF wet fraction for seismic failures - seismic interval 1 and subarea 8	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO1_9	SF wet fraction for seismic failures - seismic interval 1 and subarea 9	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO1_10	SF wet fraction for seismic failures - seismic interval 1 and subarea 10	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_1	SF wet fraction for seismic failures - seismic interval 2 and subarea 1	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO2_2	SF wet fraction for seismic failures - seismic interval 2 and subarea 2	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_3	SF wet fraction for seismic failures - seismic interval 2 and subarea 3	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_4	SF wet fraction for seismic failures - seismic interval 2 and subarea 4	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO2_5	SF wet fraction for seismic failures - seismic interval 2 and subarea 5	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_6	SF wet fraction for seismic failures - seismic interval 2 and subarea 6	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_7	SF wet fraction for seismic failures - seismic interval 2 and subarea 7	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10

SFWettedFraction_SEISMO2_8	SF wet fraction for seismic failures - seismic interval 2 and subarea 8	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_9	SF wet fraction for seismic failures - seismic interval 2 and subarea 9	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionByMechFailedWP (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.01 to 1.0.	EBSREL	ENG4	10
SFWettedFraction_SEISMO2_10	SF wet fraction for seismic failures - seismic interval 2 and subarea 10	uniform	0.033, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Update?	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_1	SF wet fraction for seismic failures - seismic interval 3 and subarea 1	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_2	SF wet fraction for seismic failures - seismic interval 3 and subarea 2	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_3	SF wet fraction for seismic failures - seismic interval 3 and subarea 3	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10

SFWettedFraction_SEISMO3_4	SF wet fraction for seismic failures - seismic interval 3 and subarea 4	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_5	SF wet fraction for seismic failures - seismic interval 3 and subarea 5	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_6	SF wet fraction for seismic failures - seismic interval 3 and subarea 6	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_7	SF wet fraction for seismic failures - seismic interval 3 and subarea 7	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_8	SF wet fraction for seismic failures - seismic interval 3 and subarea 8	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_9	SF wet fraction for seismic failures - seismic interval 3 and subarea 9	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10
SFWettedFraction_SEISMO3_10	SF wet fraction for seismic failures - seismic interval 3 and subarea 10	uniform	0.0, 1.0	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Parameter not used	EBSREL	ENG4	10

SFWettedFraction_SEISMO4_1 to be renamed as SFWettedFraction_LC_1	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 1	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_2 to be renamed as SFWettedFraction_LC_2	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 2	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_3 to be renamed as SFWettedFraction_LC_3	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 3	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_SEISMO4_4 to be renamed as SFWettedFraction_LC_4	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 4	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_5 to be renamed as SFWettedFraction_LC_5	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 5	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_6 to be renamed as SFWettedFraction_LC_6	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 6	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_SEISMO4_7 to be renamed as SFWettedFraction_LC_7	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 7	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate *but should be updated. Value allowed to vary* over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected *consistent with* InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_8 to be renamed as SFWettedFraction_LC_8	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 8	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_SEISMO4_9 to be renamed as SFWettedFraction_LC_9	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 9	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10

SFWettedFraction_SEISMO4_10 to be renamed as SFWettedFraction_LC_10	Factor determining the height of the outflow point in waste packages breached by localized corrosion, subarea 10	loguniform	0.007, 0.156	Data represents an NRC/CNWRA best estimate but should be updated. Value allowed to vary over full range of fraction; rationale for selection of PDF type and value should be consistent with Water Contact Mode flags.	Distribution selected consistent with InitialSeepageReductionFractionLC (correlated with rank correlation coefficient equal to 0.9). The ranges of the distribution were selected to cause the fraction of the waste form surface exposed to water range from 0.001 to 0.1.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_1	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 1	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_2	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 2	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_3	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 3	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_4	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 4	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_5	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 5	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_6	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 6	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_7	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 7	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_8	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 8	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
SFWettedFraction_Corrosion_9	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 9	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10

SFWettedFraction_Corrosion_10	Factor determining the height of the outflow point in waste packages breached by general corrosion, subarea 10	uniform	0.0, 1.0		Need Ref., basis / justification.	EBSREL	ENG4	10
WaterContactMode_Volcanic(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from igneous activity with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP fiailure from igneous activity. Should be set consistently with SFWettedFractions.	(B. Hill: 5/12/05)	EBSREL	ENG4	10
WaterContactMode_Initial(0=BathTub,1=FlowThrough)	Water contact mode for initial WP failure with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for initial WP failure. Should be set consistently with SFWettedFractions.	(G. Adams: 06/03/05)	EBSREL	ENG4	10
WaterContactMode_SeismicInterval1(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 1 with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP fiailure in seismic interval 1. Should be set consistently with SFWettedFractions.	(G. Adams: 06/03/05)	EBSREL	ENG4	10
WaterContactMode_SeismicInterval2(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 2 with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP fiailure in seismic interval 2. Should be set consistently with SFWettedFractions.	(G. Adams: 06/03/05)	EBSREL	ENG4	10
WaterContactMode_SeismicInterval3(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 3 with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP fiailure in seismic interval 3. Should be set consistently with SFWettedFractions.	Not used	EBSREL	ENG4	10
WaterContactMode_SeismicInterval4(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 4 with iflag = 0 for bathtub and iflag=1 for flowthrough	iflag	1	User option. Program control switch affecting water contact mode for WP fiailure in seismic interval 4. Should be set consistently with SFWettedFractions.	(G. Adams: 06/03/05)	EBSREL	ENG4	10
WasteFormDissolutionEnhancementFactor[]	waste form dissolution enhancement factor (1.0 = no enhancement). Value >= 0.	constant	1.0	User option. Needs to be set to value other than 1.0 for solubility studies. For values other than 1.0, the factor is applied as described (i.e., if value is 0.5 then only half of the solubilities are applied) The base case scenario considers only nominal. [OBS]	(R. Janetzke: 5/23/05)	EBSREL	ENG4	10

Preexponential_SFDissolution Model2	Pre-exponential factor for spent fuel dissolution rate from (mg/m2-d)	loguniform	1.022e4, 1.022e7	Based on experience and knowledge of other systems, the numerical ranges for the multiplication factors for spent fuel dissolution are estimated: (1) Ca/Si to carbonate solutions: [0.01, 1.0] mg/(m2-d); (2) pH from 8 to 4.5: a factor [1, 5]; (3) surface area increase from grain opening: a factor [1, 3]; (4) surface roughness: a factor 3; (5) drip rate: a factor [0.1, 1.0]; (6) partial cladding protection: a factor [0.01, 0.1]; and (7) iron compound effects: a factor [0.1, 1.0]. Assuming all these uncertainty distributions were uniform, they are convolved into a single distribution by multiplication. This yeilds an approximately lognormal distribution. The end points of the distribution are taken as plus or minus 3 sigma. References for the data base include: Ahn and Mohanty (2004), EURATOM (2000), Shoesmith (2000), Oversby and Konsult (1999), Cunnane (1999), Finn et al. (1998), Shoesmith et al. (1998, 1988), Forsyth (1997), Tait and Luth (1997), Torrero et al. (1997), Sunder et al (1997), de Pablo et al. (1997), Stroes-Gascoyne et al. (1997, 1985), Garcia-Serrano et al. (1996), Bruno et al. (1995),	Dissolution rates of the order of 0.01 to 10 mg/(m^2 d) have been experimentally observed at 25°C [77°F]. The activation energy to compute dissolution rates at different temperatures is 34.3 kJ/mol (hard-wired in the TPA code).	EBSREL	ENG4	10

InitialRadiusOfSFParticles[m]	Initial radius of spent nuclear fuel particle used to compute the specific area [m2/mg].	constant	1.286E-3	Based on studies by Guenther et al. (1991) and Belle (1961) [EXP, OBS]	Radius of SF particle [m] used to compute the specific area [m2/mg]. According to CSNF Waste Form Degradation: Summary Abstraction, ANL-EBS-MD-000015 REV 02, August 2004, the expected value of the specific area is 2.2×10^{-7} m2/mg, based on spent fuel grain dimensions. By multiplying the specific area by the spent fuel dissolution rate [specified in units of mg/(m2 day) in the TPA code], the fractional release rate is determined (in units of 1/Time) and used to compute spent fuel dissolution rates by radionuclide. In the nominal case, by considering the specific area as a constant, uncertainty in the fractional release derives from uncertainty in the spent fuel	EBSREL	ENG4	10
DefectiveFractionOfWPs/cell	Fraction of total WPs in an SA that fails at time specified for InitialFailureTimeyr	loguniform	1.0e-4, 1.0e-2	Reported range estimated from analogous data in NRC (1973, 1979, 1984, 1988b), SKI (1996), Timmins (1998), Tschoepe et al (1994), Jain et. al, (2003) and Bullen and Apted (2004). Uncertainties remain regarding welding inspections. Data updates expected following the license submission [EXP]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
WPInternalVolume[m3]	Internal WP volume where water can reside (m3)	constant	4.6	Geochemistry validation report ANL-EBS-GS-00001. Rev 0 (2001)	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForCM246	Cm-246/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForU238	U-238/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10

GapFractionForCM245	Cm-245/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForAM241	Am-241/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForNP237	Np-237/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForAM243	Am-243/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForPU239	Pu-239/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForPU240	Pu-240/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForU234	U-234/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForTH230	Th-230/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForRA226	Ra-226/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForPB210	Pb-210/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05) not in ref list	EBSREL	ENG4	10

GapFractionForCS135	Cs-135/kg of SF in grain and pellet cladding gap	triangular	8.8e-3, 2.5e-2, 5.8e-2	Range based on limited data on high burn-up spent nuclear fuel. Combination of gap and grain boundary release and fission gas release data was used to estimate instant release fraction. Review data provided in Jain et. al., (2004).	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForI129	I-129/kg of SF in grain and pellet cladding gap	triangular	5.4e-3, 1.1e-1, 3.2e-1	Range based on limited data on high burn-up spent nuclear fuel. Combination of gap and grain boundary release and fission gas release data was used to estimate instant release fraction. Review data provided in Jain et. al., (2004).	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForTC99	Tc-99/kg of SF in grain and pellet cladding gap	triangular	5.0e-4, 1.3e-3, 2.8e-3	Range based on limited data on high burn-up spent nuclear fuel. Combination of gap and grain boundary release and fission gas release data was used to estimate instant release fraction. Review data provided in Jain et. al., (2004).	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForNI59	Ni-59/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForCL36	Cl-36/kg of SF in grain and pellet cladding gap	triangular	5.4e-3, 1.1e-1, 3.2e-1	Range based on limited data on high burn-up spent nuclear fuel. Combination of gap and grain boundary release and fission gas release data was used to estimate instant release fraction. Review data provided in Jain et. al., (2004).	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForSE79	Se-79/kg of SF in grain and pellet cladding gap	triangular	8.8e-3, 2.5e-2, 5.8e-2	Range based on limited data on high burn-up spent nuclear fuel. Combination of gap and grain boundary release and fission gas release data was used to estimate instant release fraction. Review data provided in Jain et. al., (2004).	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForNB94	Nb-94/kg of SF in grain and pellet cladding gap	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForU233	percent of U233 inventory contained in the gap (I.e., instant fraction released)	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForTH229	percent of Th229 inventory contained in the gap (I.e., instant fraction released)	constant	0.0	Expected to be small because solid state diffusion coefficients are very small; see also Johnson and Tait (1997) and Johnson and McGinnes (2002) Review of data provided in Jain et. al., (2004) [OBS]	(V. Jain: 5/9/05)	EBSREL	ENG4	10
GapFractionForPU242		constant	0.0		(SCR 626 4/19/2006)	EBSREL	ENG4	10
SeepageRubbleFactor		constant	1.0		(O. Pensado R. Fedors SCR 608);	EBSREL	ENG4	10

SeepageEngineeringBackfillFactor		constant	1.0	(O. Pensado R. Fedors SCR 608);	EBSREL	ENG4	10
InitialSeepageReductionFractionByMechFailedDS		loguniform	0.01, 1.0	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
DSSeepageProtectionDegradationRate[1/yr]		constant	0.0	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
FlagPartialProtectionAgainstSeepageByMechFailedDS[1=yes,0=no]		iflag	1	(O. Pensado R. Fedors SCR 608);	EBSREL	ENG4	10
InitialSeepageReductionFractionByMechFailedWP		uniform	0.01, 1.0	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
WPSeepageProtectionDegradationRate[1/yr]		constant	0.0	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
FlagPartialProtectionAgainstSeepageByMechFailedWP[1=yes,0=no]		iflag	1	(O. Pensado R. Fedors SCR 608);	EBSREL	ENG4	10
InitialSeepageReductionFractionLC	Ratio of the flow rate infiltrating a breached waste package and the flow rate impinging on the waste package, localized corrosion waste packages	loguniform	0.001, 0.1	(O. Pensado SCR 651)	EBSREL	ENG4	10
InitialSeepageReductionFractionWeldLC (previously WeldAdvectiveFraction[])	Ratio of the flow rate infiltrating a breached waste package and the flow rate impinging on the waste package; WPs breached on welded areas	loguniform	0.001, 0.1				
InitialSeepageReductionFractionInitiallyDefWP	Ratio of the flow rate infiltrating a breached waste package and the flow rate impinging on the waste package, localized corrosion waste packages	loguniform	0.001, 0.1				
WPSeepageProtectionDegradationRateInitiallyDefWP[1/yr]	Rate of increase in the seepage factor; initially defective waste packages	constant	0.0				
AFmultCoefficient		constant	0.9	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
BFmultCoefficient		constant	0.22	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10
X0FmultCoefficient		triangular	1.0, 1.47, 2.0	(O. Pensado R. Fedors SCR 608) (O. Pensado SCR 626)	EBSREL	ENG4	10

UseTimesOrSEISMOIntervals (0=Times,1=Intervals)		iflag	1		(O. Pensado R. Fedors SCR 608); Parameter to be deleted.	EBSREL	ENG4	10
CladdingVelocityEnhancementFactor[]	multiplication factor for clad splitting model caused by fuel splitting	triangular	1.0, 40.0, 240.0	Current data taken from DOE T5PA-SR model; the underlying models, data and understanding are empirical and may no longer be endorsed by DOE. It is unclear that clad could split by this mechanism BG: QA response states data "taken from DOE TSPA-SR model, T?R-045-PA-000001, Rev 00,????, page 3-116, Dec 2002; ref not found T.Ahn: Although this model can be embedded in TPA, the environmental conditions for the onset of cladding splitting are unlikely at repository temperatures [Ahn and Mohanty, 2004]. If it happened, the current TPA Preexponential_SFDissolutionModel2 captures it. [T. Ahn and S. Mohanty. "Dissolution Kinetics of Spent Nuclear Fuel (SNF) in the Proposed Yucca Mountain Repository Environment." Presentation at the MRS Symposium CC: Scientific Basis for Nuclear Waste Management XXVIII, April 12 - 16, 2004. San Francisco, California. ML041000524. 2004]	Value not relevant if instantaneous unzipping is considered	EBSREL/Cladding	ENG4	10
FuelRodHalfLength[m]	Fuel rod half length (m)	constant	0.0	Dimensions are consistent with typical light water reactor fuel, expecially PWR.	Value selected to force instantaneous unzipping	EBSREL/Cladding	ENG4	10
FuelRadiusInRod[m]	Fuel radius in rod (m)	constant	0.005	Dimensions are consistent with typical light water reactor fuel, expecially PWR.	Value not relevant if instantaneous unzipping is considered	EBSREL/Cladding	ENG4	10
WeldCrackLength[m]	Approximate length of weld thickness at end cap.	constant	0.1	Based on experience and knowledge of physical layout of waste package and DOE testimates of welds. This model will not be used in TPA 5.0.	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
TotalAreaOfCracksPerWPAtEmplacement[m^2]	Total area of cracks per waste package at emplacement (m^2)	constant	2.0e-5	per 3/28/05 email from Tae Ahn: need to determine a distribution (w/ D. Dunn & Y. Pan) per 3/21/05 email from Osvaldo: no change required; conservative	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
SlopeOfCrackAreaCurve[m^2/yr]		constant	2.0e-9	Crack area doubles by 10,000 years. This model will not be used in TPA 5.0.	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
LengthOfFilmPathInsideWP[m]	Plausible minimum distance from inside crack to fuel.	constant	0.2	Based on experience and knowledge of physical layout of waste package and DOE testimates of welds. This model will not be used in TPA 5.0.	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
InternalFilmCrossSectionalArea[m^2]	Maximum likely film thickness in humid conditions.	constant	2.0e-5	Based on experience and knowledge of physical layout of waste package and DOE testimates of welds. This model will not be used in TPA 5.0.	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10

SelfDiffusionCoefficientOfWaterAt20C[m^2/s]	constant	2.2e-9	Same as DiffusionCorrectionFactor_C[]	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
FractionOfWPsWithDiffusionTilt[]	constant	0.0	Based on estimate that most WPs won't fall off supports or have them corrode away. Of those that have failed supports, at least half will fail with the welded end down, or will end up horizontal on surface. This model will not be used in TPA 5.0.	Value selected to deactivate diffusive release.	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorCm[]	constant	0.25	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactor_U[]	constant	0.29	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorAm[]	constant	0.26	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorNp[]	constant	0.33	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorPu[]	constant	0.25	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorTh[]	constant	0.25	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10

DiffusionCorrectionFactorRa[]	constant	0.25	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorPb[]	constant	0.55	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorCs[]	constant	1.0	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactor_I[]	constant	0.96	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorTc[]	constant	0.64	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorNi[]	constant	0.55	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorSe[]	constant	0.32	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10

DiffusionCorrectionFactorNb		constant	0.55	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
DiffusionCorrectionFactorCl[]		constant	0.96	Estimate for diffusion correction cited in "EBS Radionuclide Transport Abstraction" ANL-WIS-PA-000001 REV 00 or Handbook Chem Physics, or estimated on valence of most liekly ions. BG: ANL-WIS-PA-000001 ref not found; Handbook ref is likely Lide (1994) and/or Weast (1976, 1984))	Value not relevant if diffusive release is deactivated	EBSREL/Diffusion	ENG4	10
SurfaceAreaOfGlass[m^2/kg]		constant	2.766245		Need Description, Ref., basis / justification.	EBSREL/Glass	ENG4	10
LogOfGlassDissolutionConstantHighRange[]		uniform	4.708618, 5.708618	possible source: MDL-WIS-PA-000002	Need description.	EBSREL/Glass	ENG4	10
pHParameterHighRange[]		constant	0.49	Same as GlassActivationEnergyHighRange[kJ/mol-K] possible source: MDL-WIS-PA-000002	Need description. Check Ref.	EBSREL/Glass	ENG4	10
GlassActivationEnergyHighRange[kJ/mol-K]		constant	69	possible source: MDL-WIS-PA-000002	Need description. Check Ref.	EBSREL/Glass	ENG4	10
LogOfGlassDissolutionConstantLowRange[]		uniform	6.308618, 8.308618	possible source: MDL-WIS-PA-000002	Need description. Check Ref.	EBSREL/Glass	ENG4	10
pHParameterLowRange[]		constant	-0.49	Same as GlassActivationEnergyHighRange[kJ/mol-K] possible source: MDL-WIS-PA-000002	Need description. Check Ref.	EBSREL/Glass	ENG4	10
GlassActivationEnergyLowRange[kJ/mol-K]		constant	31	Same as GlassActivationEnergyHighRange[kJ/mol-K] possible source: MDL-WIS-PA-000002	Need description. Check Ref.	EBSREL/Glass	ENG4	10
pHForGlassModel[]	pH for Glass Model	uniform	4.0, 10.0	Based on DOE EQ3/6 simulations of in-package chemistry presented in ANL-EBS-000050 (DOE 1994) and Pan et. al., (2003). Based on the observed pH range in the presence of corrosion products.	(V. Jain: 5/9/05)	EBSREL/Glass	ENG4	10
Probability_WPWaterContact_GC-Flt-Ig	Probability that seepage may contact waste packages breached by general corrosion, or faulting, or intrusive igneous event	constant	1.0					
Probability_WPWaterAllowance_GC-Flt-Ig	Probability that seepage may infiltrate a breached WP (general corrosion, faulting, intrusive igneous event), conditional on seepage contact	constant	1.0					
Probability_WPWaterContact_InitialDefects	Probability that seepage may contact an initially defective waste package	constant	1.0					
Probability_WPWaterAllowance_InitialDefects	Probability that seepage may infiltrate an initially defective WP, conditional on seepage contact	uniform	0.001, 0.1					
Probability_WPWaterContact_MechFail	Probability that seepage may contact a mechanically breached waste package	constant	1.0					

Probability_WPWaterAllowance_MechFail	Probability that seepage may infiltrate a mechanically breached WP, conditional on seepage contact	uniform	0.01, 1.0
Probability_WPWaterContact_LC	Probability that seepage may contact appropriate regions on the waste package (e.g. crevice areas) to cause the formation of brines and induce localized corrosion	uniform	0.001, 0.1
Probability_WPWaterAllowance_LC	Probability that seepage may infiltrate a WP breached by localized corrosion, conditional on seepage contact	constant	1.0

Name	Description
PermanentLossColloidFilterFactor_Invert_Ja[]	The proportion of americium irreversibly attached to colloids that is permanently removed by filtration in the invert
PermanentLossColloidFilterFactor_Invert_Jc[]	The proportion of curium irreversibly attached to colloids that is permanently removed by filtration in the invert
PermanentLossColloidFilterFactor_Invert_Jp[]	The proportion of plutonium irreversibly attached to colloids that is permanently removed by filtration in the invert
PermanentLossColloidFilterFactor_Invert_Jt[]	The proportion of thorium irreversibly attached to colloids that is permanently removed by filtration in the invert
InvertThickness[m]	Invert thickness (m)
InvertDiffusionCoefficient[m^2/yr]	*Diffusion coefficient for the invert (m2/yr)*
InvertBypass(0=ebsfilt,1=bypass-ebsfilt)	Flag for selecting to perform calculations for transport through the invert. A value of 1 indicates that the transport through invert is skipped
InvertRockPorosity	Porosity of the invert
InvertMatrixPermeability[m^2]	Matrix permeability of the invert (m2)
IrreversibleColloidModel[0=no,1=yes]	Program switch to control the introduction of irreversible redionuclides into the ground water transport models. (0 = no colloids are introduced; 1 = colloids are introduced.)
WastePackageFlowMultiplicationFactor	Factor that is multiplied by the flow rate hitting a WP. The resulting flow rates are written to ebsflo.dat which is an input file to the releaset.f stand-alone code.
NegativeLog10CarbonateConcentration[mol/L]	Negative log10 of carbonate concentration (mol/L) in water in contact with spent fuel
RD_Invert_Cm	Retardation factor of Cm in invert
RD_Invert_Pu	Retardation factor of Pu in invert
RD_Invert_U	Retardation factor of U in invert
RD_Invert_Am	Retardation factor of Am in invert
RD_Invert_Np	Retardation factor of Np in invert
RD_Invert_Th	Retardation factor of Th in invert
RD_Invert_Ra	Retardation factor of Ra in invert
RD_Invert_Pb	Retardation factor of Pb in invert
RD_Invert_Cs	*Retardation factor of Cs in invert*
RD_Invert_I	Retardation factor of I in invert
RD_Invert_Tc	Retardation factor of Tc in invert
RD_Invert_Ni	Retardation factor of Ni in invert
RD_Invert_Cl	Retardation factor of Cl in invert

RD_Invert_Se	Retardation factor of Se in invert
RD_Invert_Nb	Retardation factor of Nb in invert
SorptionCapacity[moles/m3]	
AffinityFactorAm	
AffinityFactorCm	
AffinityFactorTh	
AffinityFactor_U	
SolubilityAm[kg/m3]	Solubility limit for americium
SolubilityNp[kg/m3]	Spent fuel Neptunium solubility limit
Solubility_I[kg/m3]	Solubility limit for iodine
SolubilityTc[kg/m3]	Solubility limit for technetium
SolubilityCl[kg/m3]	Solubility limit for chlorine
Solubility_U[kg/m3]	Solubility limit for uranium
SolubilityCm[kg/m3]	Solubility limit for curium
SolubilityPu[kg/m3]	Solubility limit for plutonium
SolubilityTh[kg/m3]	Solubility limit for thorium
SolubilityRa[kg/m3]	Solubility limit for radium
SolubilityPb[kg/m3]	Solubility limit for lead
SolubilityCs[kg/m3]	Solubility limit for cesium
SolubilityNi[kg/m3]	Solubility limit for nickel
SolubilitySe[kg/m3]	Solubility limit for selenium
SolubilityNb[kg/m3]	Solubility limit for niobium
WaterContactMode_Faulting(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from faulting with iflag = 0 for bathtub and iflag=1 for flowthrough
WeldAdvectiveFraction[]	
WaterContactMode_Corrosion(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from corrosion with iflag = 0 for bathtub and iflag=1 for flowthrough
SubAreaWetFraction	Subarea wet fraction
InitialFailureTime[yr]	Failure time for initially defective WPs
NumberOfSEISMOWPFailureIntervalues	Number of intervalues used for evaluating release from WPs failed due to seismically induced rockfall (4 intervalues selected as a reasonable compromise between efficiency and impact of variation over the time of WP failures)
BeginningOfSEISMOWPFailureInterval1[yr]	First interval (0–2,000 yr) selected to capture WP failures at the hottest temperatures (note: failure time is 1,000 yr)
BeginningOfSEISMOWPFailureInterval2[yr]	Second interval (2,000–5,000 yr) selected to capture WP failures at the intermediate temperatures (note: failure time is 3,500 yr)

BeginningOfSEISMOWPFailureInterval3[yr]	Third interval (5,000–10,000 yr) selected to capture WP failures through the cool down phase (note: failure time is 7,500 yr)
BeginningOfSEISMOWPFailureInterval4[yr]	Last interval (10,000 until the minimum of the end of the simulation and the corrosion failure time) selected to capture WP failure of long-lived containers (note: failure time is the mean of the 10,000 yr and the minimum of the simulation period and corr
FlowOnsetTemperature[C]	Flow onset temperature
SFDensity[kg/m3]	Spent fuel density (kg/m3)
IModel	Selection of model for computing SF dissolution (1=absence of Ca and Si, 2=presence of Ca and Si, 3=user specified, 4=schoepite equilibrium, 5=glass model (this is not user selectable and can only be set by the TPA executive)
OxygenPartialPressure[atm]	Oxygen partial pressure (over pressure) (atm)
UserLeachRate[kg/yr/m2]	User-provided leaching rate (kg/yr/m2) used if IModel = 3
CladdingCorrectionFactor	Cladding correction factor
SFWettedFraction_Initial_1	SF wet fraction for initial failures in subarea 1
SFWettedFraction_Initial_2	SF wet fraction for initial failures in subarea 2
SFWettedFraction_Initial_3	SF wet fraction for initial failures in subarea 3
SFWettedFraction_Initial_4	SF wet fraction for initial failures in subarea 4
SFWettedFraction_Initial_5	SF wet fraction for initial failures in subarea 5
SFWettedFraction_Initial_6	SF wet fraction for initial failures in subarea 6
SFWettedFraction_Initial_7	SF wet fraction for initial failures in subarea 7
SFWettedFraction_Initial_8	SF wet fraction for initial failures in subarea 8
SFWettedFraction_Initial_9	SF wet fraction for initial failures in subarea 9
SFWettedFraction_Initial_10	SF wet fraction for initial failures in subarea 10
SFWettedFraction_FAULTO	SF wet fraction for faulting failures
SFWettedFraction_VOLCANO	SF wet fraction for volcanic failures
SFWettedFraction_SEISMO1_1	SF wet fraction for seismic failures - seismic interval 1 and subarea 1
SFWettedFraction_SEISMO1_2	SF wet fraction for seismic failures - seismic interval 1 and subarea 2
SFWettedFraction_SEISMO1_3	SF wet fraction for seismic failures - seismic interval 1 and subarea 3
SFWettedFraction_SEISMO1_4	SF wet fraction for seismic failures - seismic interval 1 and subarea 4
SFWettedFraction_SEISMO1_5	SF wet fraction for seismic failures - seismic interval 1 and subarea 5
SFWettedFraction_SEISMO1_6	SF wet fraction for seismic failures - seismic interval 1 and subarea 6
SFWettedFraction_SEISMO1_7	SF wet fraction for seismic failures - seismic interval 1 and subarea 7
SFWettedFraction_SEISMO1_8	SF wet fraction for seismic failures - seismic interval 1 and subarea 8
SFWettedFraction_SEISMO1_9	SF wet fraction for seismic failures - seismic interval 1 and subarea 9
SFWettedFraction_SEISMO1_10	SF wet fraction for seismic failures - seismic interval 1 and subarea 10

SFWettedFraction_SEISMO2_1	SF wet fraction for seismic failures - seismic interval 2 and subarea 1
SFWettedFraction_SEISMO2_2	SF wet fraction for seismic failures - seismic interval 2 and subarea 2
SFWettedFraction_SEISMO2_3	SF wet fraction for seismic failures - seismic interval 2 and subarea 3
SFWettedFraction_SEISMO2_4	SF wet fraction for seismic failures - seismic interval 2 and subarea 4
SFWettedFraction_SEISMO2_5	SF wet fraction for seismic failures - seismic interval 2 and subarea 5
SFWettedFraction_SEISMO2_6	SF wet fraction for seismic failures - seismic interval 2 and subarea 6
SFWettedFraction_SEISMO2_7	SF wet fraction for seismic failures - seismic interval 2 and subarea 7
SFWettedFraction_SEISMO2_8	SF wet fraction for seismic failures - seismic interval 2 and subarea 8
SFWettedFraction_SEISMO2_9	SF wet fraction for seismic failures - seismic interval 2 and subarea 9
SFWettedFraction_SEISMO2_10	SF wet fraction for seismic failures - seismic interval 2 and subarea 10
SFWettedFraction_SEISMO3_1	SF wet fraction for seismic failures - seismic interval 3 and subarea 1
SFWettedFraction_SEISMO3_2	SF wet fraction for seismic failures - seismic interval 3 and subarea 2
SFWettedFraction_SEISMO3_3	SF wet fraction for seismic failures - seismic interval 3 and subarea 3
SFWettedFraction_SEISMO3_4	SF wet fraction for seismic failures - seismic interval 3 and subarea 4
SFWettedFraction_SEISMO3_5	SF wet fraction for seismic failures - seismic interval 3 and subarea 5
SFWettedFraction_SEISMO3_6	SF wet fraction for seismic failures - seismic interval 3 and subarea 6
SFWettedFraction_SEISMO3_7	SF wet fraction for seismic failures - seismic interval 3 and subarea 7
SFWettedFraction_SEISMO3_8	SF wet fraction for seismic failures - seismic interval 3 and subarea 8
SFWettedFraction_SEISMO3_9	SF wet fraction for seismic failures - seismic interval 3 and subarea 9
SFWettedFraction_SEISMO3_10	SF wet fraction for seismic failures - seismic interval 3 and subarea 10
SFWettedFraction_SEISMO4_1	SF wet fraction for seismic failures - seismic interval 4 and subarea 1
SFWettedFraction_SEISMO4_2	SF wet fraction for seismic failures - seismic interval 4 and subarea 2
SFWettedFraction_SEISMO4_3	SF wet fraction for seismic failures - seismic interval 4 and subarea 3
SFWettedFraction_SEISMO4_4	SF wet fraction for seismic failures - seismic interval 4 and subarea 4
SFWettedFraction_SEISMO4_5	SF wet fraction for seismic failures - seismic interval 4 and subarea 5
SFWettedFraction_SEISMO4_6	SF wet fraction for seismic failures - seismic interval 4 and subarea 6
SFWettedFraction_SEISMO4_7	SF wet fraction for seismic failures - seismic interval 4 and subarea 7
SFWettedFraction_SEISMO4_8	SF wet fraction for seismic failures - seismic interval 4 and subarea 8
SFWettedFraction_SEISMO4_9	SF wet fraction for seismic failures - seismic interval 4 and subarea 9
SFWettedFraction_SEISMO4_10	SF wet fraction for seismic failures - seismic interval 4 and subarea 10
SFWettedFraction_Corrosion_1	SF wet fraction for corrosion failures in subarea 1
SFWettedFraction_Corrosion_2	SF wet fraction for corrosion failures in subarea 2
SFWettedFraction_Corrosion_3	SF wet fraction for corrosion failures in subarea 3
SFWettedFraction_Corrosion_4	SF wet fraction for corrosion failures in subarea 4
SFWettedFraction_Corrosion_5	SF wet fraction for corrosion failures in subarea 5
SFWettedFraction_Corrosion_6	SF wet fraction for corrosion failures in subarea 6
SFWettedFraction_Corrosion_7	SF wet fraction for corrosion failures in subarea 7

SFWettedFraction_Corrosion_8	SF wet fraction for corrosion failures in subarea 8
SFWettedFraction_Corrosion_9	SF wet fraction for corrosion failures in subarea 9
SFWettedFraction_Corrosion_10	SF wet fraction for corrosion failures in subarea 10
WaterContactMode_Volcanic(0=BathTub,1=FlowThrough)	Water contact mode for WP failure from igneous activity with iflag = 0 for bathtub and iflag=1 for flowthrough
WaterContactMode_Initial(0=BathTub,1=FlowThrough)	Water contact mode for initial WP failure with iflag = 0 for bathtub and iflag=1 for flowthrough
WaterContactMode_SeismicInterval1(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 1 with iflag = 0 for bathtub and iflag=1 for flowthrough
WaterContactMode_SeismicInterval2(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 2 with iflag = 0 for bathtub and iflag=1 for flowthrough
WaterContactMode_SeismicInterval3(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 3 with iflag = 0 for bathtub and iflag=1 for flowthrough
WaterContactMode_SeismicInterval4(0=BathTub,1=FlowThrough)	Water contact mode for WP failure in seismic interval 4 with iflag = 0 for bathtub and iflag=1 for flowthrough
WasteFormDissolutionEnhancementFactor[]	waste form dissolution enhancement factor (1.0 = no enhancement). Value >= 0.
Preexponential_SFDissolutionModel2	Pre-exponential factor for spent fuel dissolution rate from (mg/m2-d)
InitialRadiusOfSFParticles[m]	Initial radius of UO2 particle (m)
DefectiveFractionOfWPs/cell	Fraction of total WPs in an SA that fails at time specified for InitialFailureTimeyr
WPInternalVolume[m3]	Internal WP volume where water can reside (m3)
GapFractionForCM246	Cm-246/kg of SF in grain and pellet cladding gap
GapFractionForU238	U-238/kg of SF in grain and pellet cladding gap
GapFractionForCM245	Cm-245/kg of SF in grain and pellet cladding gap
GapFractionForAM241	Am-241/kg of SF in grain and pellet cladding gap
GapFractionForNP237	Np-237/kg of SF in grain and pellet cladding gap
GapFractionForAM243	Am-243/kg of SF in grain and pellet cladding gap
GapFractionForPU239	Pu-239/kg of SF in grain and pellet cladding gap
GapFractionForPU240	Pu-240/kg of SF in grain and pellet cladding gap
GapFractionForU234	U-234/kg of SF in grain and pellet cladding gap
GapFractionForTH230	Th-230/kg of SF in grain and pellet cladding gap
GapFractionForRA226	Ra-226/kg of SF in grain and pellet cladding gap
GapFractionForPB210	Pb-210/kg of SF in grain and pellet cladding gap
GapFractionForCS135	Cs-135/kg of SF in grain and pellet cladding gap
GapFractionForI129	I-129/kg of SF in grain and pellet cladding gap

GapFractionForTC99	Tc-99/kg of SF in grain and pellet cladding gap
GapFractionForNI59	Ni-59/kg of SF in grain and pellet cladding gap
GapFractionForCL36	Cl-36/kg of SF in grain and pellet cladding gap
GapFractionForSE79	Se-79/kg of SF in grain and pellet cladding gap
GapFractionForNB94	Nb-94/kg of SF in grain and pellet cladding gap
GapFractionForU233	percent of U233 inventory contained in the gap (I.e., instant fraction released)
GapFractionForTH229	percent of Th229 inventory contained in the gap (I.e., instant fraction released)
GapFractionForPU242	
SeepageRubbleFactor	
SeepageEngineeringBackfillFactor	
InitialSeepageReductionFractionByMechFailedDS	
DSSeepageProtectionDegradationRate[1/yr]	
FlagPartialProtectionAgainstSeepageByMechFailedDS[1=yes,0=no]	
InitialSeepageReductionFractionByMechFailedWP	
WPSeepageProtectionDegradationRate[1/yr]	
FlagPartialProtectionAgainstSeepageByMechFailedWP[1=yes,0=no]	
InitialSeepageReductionFractionLC	Fraction of seepage that enters a WP as a result of localized corrosion
AFmultCoefficient	
BFmultCoefficient	
X0FmultCoefficient	
UseTimesOrSEISMOIntervals(0=Times,1=Intervals)	
CladdingVelocityEnhancementFactor[]	multiplication factor for clad splitting model caused by fuel splitting
FuelRodHalfLength[m]	Fuel rod half length (m)
FuelRadiusInRod[m]	Fuel radius in rod (m)
WeldCrackLength[m]	Approximate length of weld thickness at end cap.
TotalAreaOfCracksPerWPAtEmplacement[m^2]	Total area of cracks per waste package at emplacement (m^2)
SlopeOfCrackAreaCurve[m^2/yr]	
LengthOfFilmPathInsideWP[m]	Plausible minimum distance from inside crack to fuel.
InternalFilmCrossSectionalArea[m^2]	Maximum likely film thickness in humid conditions.
SelfDiffusionCoefficientOfWaterAt20C[m^2/s]	
FractionOfWPsWithDiffusionTilt[]	
DiffusionCorrectionFactorCm[]	
DiffusionCorrectionFactor_U[]	

DiffusionCorrectionFactorAm[]	
DiffusionCorrectionFactorNp[]	
DiffusionCorrectionFactorPu[]	
DiffusionCorrectionFactorTh[]	
DiffusionCorrectionFactorRa[]	
DiffusionCorrectionFactorPb[]	
DiffusionCorrectionFactorCs[]	
DiffusionCorrectionFactor_I[]	
DiffusionCorrectionFactorTc[]	
DiffusionCorrectionFactorNi[]	
DiffusionCorrectionFactorSe[]	
DiffusionCorrectionFactorNb	
DiffusionCorrectionFactorCl[]	
SurfaceAreaOfGlass[m^2/kg]	
LogOfGlassDissolutionConstantHighRange[]	
pHParameterHighRange[]	
GlassActivationEnergyHighRange[kJ/mol-K]	
LogOfGlassDissolutionConstantLowRange[]	
pHParameterLowRange[]	
GlassActivationEnergyLowRange[kJ/mol-K]	
pHForGlassModel[]	pH for Glass Model