LSNReviews

From: Michael Waters [MDW1@nrc.gov]
Sent: Monday, March 21, 2005 9:29 AM
To: dfarrell@cnwra.swri.edu; Donald Hooper; Gary Walter; Gordon Wittmeyer; Paul Bertetti; Patrick Laplante; Roland Benke; Ronald Green; rnes@cnwra.swri.edu; Sitakanta Mohanty; John Trapp; John Bradbury; Keith Compton; Michael Waters; Tina Ghosh; Timothy McCartin
Cc: bhill@cnwra.swri.edu; Bret Leslie; Christopher Grossman
Subject: FYI & Action Requested (DOSE2) - TPA Parameter Evaluation for Biosphere
Attachments: TPA Parameter Evaluation for Biosphere (1.30 MB)

Biosphere Team:

Attached is the email to Ron Janetzke that contains the Biosphere Team's evaluation of TPA parameters. Thanks to everyone who reviewed and provided comments, and to Pat and Roland who put them together.

Our next task is providing comments on TPA Auxiliary Data, which is due end of this week (3/25). Please work with the lead authors and CNWRA leads, as necessary, to provide comments in a timely manner.

DOSE2 Team: As indicated in the end of the attached email, Pat has recommended changing the Kds for ash in the ASHRMOVO module from constants to sampling, which would be consistent with the sampling method for the normal soil redistribution model. There may be past comments on the need & benefit for sampling ash Kds, and perhaps the appropriate data to support ash sampling numbers (Note: Patrick has pointed out the current ask Kd constants come from the same source as the soil Kds).

Action: Please work with Pat/Roland on this issue today and tomorrow to develop a consensus. I have asked Pat to contact appropriate DOSE2 Team members to discuss issue. We can then forward the recommended sampling values to Ron, if necessary.

Thanks for your help,

Mike
301-415-3875

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Date: Mon, 21 Mar 2005 08:28:47 -0500
From: Michael Waters <MDW1@nrc.gov>
Subject: FYI & Action Requested (DOSE2) - TPA Parameter Evaluation for
Biosphere
To: dfarrell@cnwra.swri.edu, dhooper@cnwra.swri.edu, gwalter@cnwra.swri.edu,
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LSNReviews

From: Michael Waters [MDW1@nrc.gov]
Sent: Friday, March 18, 2005 7:03 PM
To: Ronald Janetzke
Cc: David Farrell; Patrick Laplante; Roland Benke; Sitakanta Mohanty; Andy Campbell; Christopher Grossman; John Trapp; James Rubenstone; Keith Compton
Subject: TPA Parameter Evaluation for Biosphere
Attachments: GENTPA-DOSE2-TPA.xls; GENTPA-DOSE3-TPA.xls; DCAGS-DOSE2-TPA.wpd; ASHRMOVO-DOSE2-TPA.xls; ASHREMOB-DOSE2-TPA.wpd; AmbientSed-datapairs.doc

Ron,

Attached are consolidated files that represent the Biosphere team review of relevant TPA parameters. As discussed earlier with you, each file is in a slightly different format. The files consist of the following:

1 . GENTPA-DOSE2-TPA.xls - Excel Spreadsheet with evaluation and changes for relevant DOSE 2 parameters in the GENTPA module (Contact: Patrick LaPlante)

2. GENTPA-DOSE3-TPA.xls - Excel Spreadsheet with evaluation and changes for relevant DOSE 3 parameters in the GENTPA and DCGAW modules (Contact: Patrick LaPlante)

3. DCAGS-DOSE2-TPA.wpd - WordPerfect Table with evaluation and changes for relevant DOSE2 parameters in the DCAGS module (Contact: Roland Benke)

4. ASHRMOVO-DOSE2.xls - Excel Spreadsheet with evaluation and changes for relevant DOSE 2 parameters in the ASHRMOVO module (Contact: Patrick LaPlante)

5. ASHREMOB-DOSE2.wpd - WordPerfect Table with evaluation and changes for relevant DOSE 2 parameters in the ASHREMOB module (Contact: Roland Benke)

6. AmbientSed-datapairs.doc - MS Word Table with user-specified parameters for AmbientSed parameter in ASHERMOB module, as specified in ASHERMOB-DOSE2.wpd (Contact: Roland Benke)

IMPORTANT NOTES:

1. Note that the remaining parameters in the DCAGW module related to groundwater withdrawal under the DOSE1 ISI are okay and do not require changes. However, there is a pending issue with the High-Level Waste Review Board that could potentially affect the groundwater withdrawal TPA model and associated parameters (Contact: David Farrell).

2. There is a current recommendation for the Kd parameters in ash, within the ASHRMOVO module, to be changed from constants to sampling (see ASHRMOVO-DOSE2.xls). This recommendation will require additional consensus among the Biosphere Team early next week (3/21). It is expected that the new values for such a change, if accepted, could be performed in a quick turn-around (1-2 days). Please keep this in mind if you intend to work on this module early next week (Contact: Patrick LaPlante).

Please let me know if you have any questions.

Thanks,

Mike Waters
301-415-3875

>>> Ron Janetzke <rjanetzke@cnwra.swri.edu> 02/08/05 11:42AM >>>

TPA Input Parameters Related to DOSE2 (for GENTPA input) with Comments

Name	Description	PDF Type	Value(s)	Comments	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE2 Input/Recommendations from P. LaPlante 3/18/05
KD_Soil_Cm[cm3/g]	Soil Kd for Cm (cm3/g)	lognormal	1.5, 1.1e+7	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1641	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Pu[cm3/g]	Soil Kd for Pu (cm3/g)	lognormal	2.0, 1.5e+5	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1642	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_U[cm3/g]	Soil Kd for U (cm3/g)	lognormal	9.3e-4, 1.3e+6	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1643	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Am[cm3/g]	Soil Kd for Am (cm3/g)	lognormal	3.7e-1, 9.9e+6	Closely related studies conducted elsewhere; based on a common compilation of KD information as documented by LaPlante and Poor (1997) [REL]	PAL	GENTPA	1644	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Np[cm3/g]	Soil Kd for Np (cm3/g)	lognormal	1.9e-2, 1.3e+3	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1645	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Th[cm3/g]	Soil Kd for Th (cm3/g)	lognormal	3.2, 3.2e+6	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1646	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Ra[cm3/g]	Soil Kd for Ra (cm3/g)	lognormal	1.3e-2, 1.9e+7	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1647	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.

KD_Soil_Pb[cm3/g]	Soil Kd for Pb (cm3/g)	lognormal	1.4e-1, 5.2e+05	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1648	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Cs[cm3/g]	Soil Kd for Cs (cm3/g)	lognormal	7.5e-2, 1.0e+6	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1649	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_I[cm3/g]	Soil Kd for I (cm3/g)	lognormal	7.2e-4, 1.4e+3	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1650	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Tc[cm3/g]	Soil Kd for Tc (cm3/g)	lognormal	2.7e-4, 3.7e+1	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1651	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Ni[cm3/g]	Soil Kd for Ni (cm3/g)	lognormal	2.9, 5.6e+04	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1652	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Cl[cm3/g]	Soil Kd for Cl (cm3/g)	constant	0.25	Uncertainty expected to be insignificant; data taken from Baes et al. (1984) [REL]	PAL	GENTPA	1653	OK -- no distribution info in source data
KD_Soil_C[cm3/g]	Soil Kd for C (cm3/g)	lognormal	3.6e-1, 7.0e+1	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1654	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.
KD_Soil_Se[cm3/g]	Soil Kd for Se (cm3/g)	lognormal	1.5e+1, 2.1e+2	Same as KD_Soil_Am[cm3/g]	PAL	GENTPA	1655	CHANGE: Recommend changing the distribution to better reflect source data. The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended. Current lognormal has values at tails that exceed range of data by as much as 3 orders of magnitude.

KD_Soil_Nb[cm3/g]	Soil Kd for Nb (cm3/g)	constant	160.0	Uncertainty expected to be insignificant; data taken from Sheppard and Thibault (1990) for sandy soil [REL]	PAL	GENTPA	1656	OK -- no distribution info in source data
AnnualPrecipitation[m/yr]	Annual precipitation rate (m/yr)	constant	0.102	Constant value based on the low expected sensitivity of the parameter. Data is annual precipitation in Amargosa Valley determined from Table 4.1-2 of Bechtel SAIC Company LLC (2003) and conforms with information in USGS (2003) [ALOG, OBS]	PAL	GENTPA	1657	OK
AnnualIrrigation[m/yr]	Annual irrigation rate (m/yr)	constant	1.05	Constant values used because uncertainty is expected to be unimportant; data taken from Bechtel SAIC Company LLC (2003) [ALOG, OBS]	PAL	GENTPA	1658	OK
SoilBulkDensity[g/cm3]	Soil bulk density (g/cm3)	constant	1.5	Based on LaPlante and Poor (1997) [OBS]	PAL	GENTPA	1659	OK
SoilVolumetricWaterContent	Soil volumetric water content (ml/cm3)	constant	0.35	Data from Tanner (1991) for soils similar to Amargosa Valley farming soils [OBS]	PAL	GENTPA	1660	OK
TotalAnnualEvapotranspiration[m]yr]	Total annual evapotranspiration (m/yr)	constant	1.07	Constant value based on the low expected sensitivity of the parameter; data derives from Bechtel SAIC Company LLC (2003) and conforms with information in USGS (2003) [OBS, ALOG]	PAL	GENTPA	1661	OK

TPA Input Parameters Related to DOSE3 with Review Team Comments

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
ReceptorGroup(1=Farming,2=Residential)	ReceptorGroup(1=Member of Farming Community, 2=Residential)	iconstant	1	PAL	DCAGW	1501	OK --Farming community consistent with Part 60
DistanceToReceptorGroup[km]	Distance to receptor group (km)	constant	18.0	PAL	DCAGW	1502	OK -- 18 km consistent with Part 60
PluvialSwitchTime[yr]	Time to switch from non pluvial (current) biosphere climate conditions to pluvial (cooler and wetter)	constant	2000.0	PAL	DCAGW	1511	OK -- consistent with updated climato.dat file which was updated based on DOE climate data
** DCAGW					DCAGW	1500	
** gentpa					GENTPA	1520	
ReceptorAgeGroup(1=Nfnt,2=Tod,3=PTeen,4=Teen,5=Adlt,6=AdltFGR11)	Selection of receptor age group (1=infant, 2=toddler, 3=preteen, 4=teen, 5=adult:ICRP72, and 6=adult:FGR11)	iconstant	6	PAL	GENTPA	1521	TPA code revision to implement ICRP72 is expected to change the name of this parameter to convey selection of radiation dosimetry method and will offer ICRP72 and FGR11 as choices
InterceptionFraction/Irrigate	Irrigation interception fraction	triangular	0.06, 0.4, 0.8	PAL	GENTPA	1522	OK
DepthOfSurfaceSoil[cm]	Depth of surface soil (cm)	constant	15.0	PAL	GENTPA	1523	OK
YearsOfIrrigationPriorToIntakePeriod[yr]	Years of irrigation water deposition prior to the intake period (yr)	iconstant	15	PAL	GENTPA	1524	OK
LeafyVegetableIrrigationRatePB[in/yr]	Leafy vegetable irrigation rate for pluvial biosphere (in/yr)	triangular	14.3, 19.5, 25.7	PAL	GENTPA	1525	OK
OtherVegetableIrrigationRatePB[in/yr]	Other vegetable irrigation rate for pluvial biosphere (in./yr)	triangular	11.1, 24.1, 42.0	PAL	GENTPA	1526	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitIrrigationRatePB[in/yr]	Fruit irrigation rate for pluvial biosphere (in./yr)	triangular	27.4, 39.4, 50.9	PAL	GENTPA	1527	OK
GrainIrrigationRatePB[in/yr]	Grain irrigation rate for pluvial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1528	OK
HomeIrrigationRatePB[in/yr]	Residential irrigation rate for pluvial biosphere (in./yr)	constant	45.0	PAL	GENTPA	1529	OK
PoultryFeedIrrigationRatePB[in/yr]	Poultry feed irrigation rate for pluvial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1530	OK
HenFeedIrrigationRatePB[in/yr]	Egg-laying hen feed irrigation rate for plubial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1531	OK
LeafyVegetableIrrigationTimePB[mo/yr]	Leafy vegetable irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1532	Ok
OtherVegetableIrrigationTimePB[mo/yr]	Other vegetable irrigation time for pluvial biosphere (mo/yr)	uniform	2.0, 10.0	PAL	GENTPA	1533	OK
FruitIrrigationTimePB[mo/yr]	Fruit irrigation rate for pluvial biosphere (in./yr)	uniform	2.0, 6.0	PAL	GENTPA	1534	OK
GrainIrrigationTimePB[mo/yr]	Grain irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1535	OK
HomeIrrigationTimePB[mo/yr]	Residential irrigation time for pluvial biosphere (mo/yr)	uniform	9.0, 12.0	PAL	GENTPA	1536	OK
PoultryFeedIrrigationTimePB[mo/yr]	Poultry feed irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1537	OK
HenFeedIrrigationTimePB[mo/yr]	Egg-laying hen feed irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1538	OK
LeafyVegetableIrrigationRateCB[in/yr]	Leafy vegetable irrigation rate for current biosphere (in./yr)	triangular	20.1, 27.4, 36.2	PAL	GENTPA	1539	OK
OtherVegetableIrrigationRateCB[in/yr]	Other vegetable irrigation rate for current biosphere (in./yr)	triangular	15.7, 34.0, 59.1	PAL	GENTPA	1540	OK
FruitIrrigationRateCB[in/yr]	Fruit irrigation rate for current biosphere (in./yr)	triangular	38.6, 55.5, 71.7	PAL	GENTPA	1541	OK
GrainIrrigationRateCB[in/yr]	Grain irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1542	OK
HomeIrrigationRateCB[in/yr]	Residential irrigation rate for current biosphere (in./yr)	constant	63.4	PAL	GENTPA	1543	OK
PoultryFeedIrrigationRateCB[in/yr]	Poultry feed irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1544	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
HenFeedIrrigationRateCB[in/yr]	Egg-laying hen feed irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1545	OK
LeafyVegetableIrrigationTimeCB[mo/yr]	Leafy vegetable irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1546	OK
OtherVegetableIrrigationTimeCB[mo/yr]	Other vegetable irrigation time for current biosphere (mo/yr)	uniform	2.0, 8.0	PAL	GENTPA	1547	OK
FruitIrrigationTimeCB[mo/yr]	Fruit irrigation rate for current biosphere (in./yr)	uniform	2.0, 3.0	PAL	GENTPA	1548	OK
GrainIrrigationTimeCB[mo/yr]	Grain irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1549	OK
HomeIrrigationTimeCB[mo/yr]	Residential irrigation time for current biosphere (mo/yr)	uniform	6.0, 12.0	PAL	GENTPA	1550	OK
PoultryFeedIrrigationTimeCB[mo/yr]	Poultry feed irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1551	OK
HenFeedIrrigationTimeCB[mo/yr]	Egg-laying hen feed irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1552	OK
PoultryFeedGrowTime[day]	Poultry feed growing time (day)	uniform	60.0, 90.0	PAL	GENTPA	1553	OK
HenFeedGrowTime[day]	Egg-laying hen feed growing time (day)	uniform	60.0, 90.0	PAL	GENTPA	1554	OK
BeefFreshForageDietFraction	Beef cattle fresh forage diet fraction	normal	0.12, 0.98	PAL	GENTPA	1555	OK
MilkFreshForageDietFraction	Dairy cattle fresh forage diet fraction	normal	0.12, 0.98	PAL	GENTPA	1556	OK
BeefFreshForageGrowTime[day]	Beef cattle fresh forage growing time (day)	uniform	30.0, 62.0	PAL	GENTPA	1557	OK
MilkFreshForageGrowTime[day]	Dairy cattle fresh forage growing time (day)	uniform	30.0, 62.0	PAL	GENTPA	1558	OK
BeefFreshForageIrrigationRatePB[in/yr]	Beef cattle fresh forage irrigation rate for pluvial biosphere (in/yr)	triangular	23.2, 36.8, 54.2	PAL	GENTPA	1559	OK
MilkFreshForageIrrigationRatePB[in/yr]	Milk fresh forage irrigation rate for pluvial biosphere (in./yr)	triangular	23.2, 36.8, 54.2	PAL	GENTPA	1560	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
BeefFreshForageIrrigationTimePB[mo/yr]	Beef cattle fresh forage irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1561	OK
MilkFreshForageIrrigationTimePB[mo/yr]	Dairy cattle fresh forage irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1562	OK
BeefFreshForageIrrigationRateCB[in/yr]	Beef cattle fresh forage irrigation rate for current biosphere (in/yr)	triangular	32.7, 51.8, 76.4	PAL	GENTPA	1563	OK
MilkFreshForageIrrigationRateCB[in/yr]	Dairy cattle fresh forage irrigation rate for current biosphere (in./yr)	triangular	32.7, 51.8, 76.4	PAL	GENTPA	1564	OK
BeefFreshForageIrrigationTimeCB[mo/yr]	Beef cattle fresh forage irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1565	OK
MilkFreshForageIrrigationTimeCB[mo/yr]	Dairy cattle fresh forage irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1566	OK
DrinkingWaterConsumptionRate1[L/yr]	Drinking water consumption rate for infant (L/yr)	lognormal	12.0, 670.0	PAL	GENTPA	1567	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate1[kg/yr]	Leafy vegetable consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1568	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate1[kg/yr]	Other vegetable consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1569	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate1[kg/yr]	Fruit consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1570	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate1[kg/yr]	Grain consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1571	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate1[kg/yr]	Beef consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1572	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate1[kg/yr]	Poultry consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1573	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate1[kg/yr]	Milk consumption rate for infant (kg/yr)	constant	226.0	PAL	GENTPA	1574	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate1[kg/yr]	Egg consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1575	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime1[hr]	Inhalation exposure time for infant (hr/yr)	constant	4563.0	PAL	GENTPA	1576	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate1[cm3/s]	Inhalation rate for infant (cm3/s)	constant	52.0	PAL	GENTPA	1577	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime1[hr]	Soil contamination exposure time for infant (hr/yr)	constant	2770.0	PAL	GENTPA	1578	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate2[L/yr]	Drinking water consumption rate for toddler (L/yr)	lognormal	50.0, 1240.0	PAL	GENTPA	1579	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate2[kg/yr]	Leafy vegetable consumption rate for toddler (kg/yr)	constant	3.5	PAL	GENTPA	1580	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate2[kg/yr]	Other vegetable consumption rate for toddler (kg/yr)	constant	16.0	PAL	GENTPA	1581	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate2[kg/yr]	Fruit consumption rate for toddler (kg/yr)	constant	48.0	PAL	GENTPA	1582	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate2[kg/yr]	Grain consumption rate for toddler (kg/yr)	constant	30.0	PAL	GENTPA	1583	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate2[kg/yr]	Beef consumption rate for toddler (kg/yr)	constant	4.0	PAL	GENTPA	1584	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate2[kg/yr]	Poultry consumption rate for toddler (kg/yr)	constant	3.0	PAL	GENTPA	1585	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate2[kg/yr]	Milk consumption rate for toddler (kg/yr)	constant	127.0	PAL	GENTPA	1586	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate2[kg/yr]	Egg consumption rate for toddler (kg/yr)	constant	1.0	PAL	GENTPA	1587	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime2[hr]	Inhalation exposure time for toddler (hr/yr)	constant	4790.0	PAL	GENTPA	1588	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate2[cm3/s]	Inhalation rate for toddler (cm3/s)	constant	88.0	PAL	GENTPA	1589	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime2[hr]	Soil contamination exposure time for toddler (hr/yr)	constant	2620.0	PAL	GENTPA	1590	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate3[L/yr]	Drinking water consumption rate for preteen (L/yr)	lognormal	50.0, 1240.0	PAL	GENTPA	1591	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate3[kg/yr]	Leafy vegetable consumption rate for preteen (kg/yr)	constant	4.8	PAL	GENTPA	1592	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate3[kg/yr]	Other vegetable consumption rate for preteen (kg/yr)	constant	22.0	PAL	GENTPA	1593	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate3[kg/yr]	Fruit consumption rate for preteen (kg/yr)	constant	52.0	PAL	GENTPA	1594	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate3[kg/yr]	Grain consumption rate for preteen (kg/yr)	constant	49.0	PAL	GENTPA	1595	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate3[kg/yr]	Beef consumption rate for preteen (kg/yr)	constant	6.0	PAL	GENTPA	1596	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate3[kg/yr]	Poultry consumption rate for preteen (kg/yr)	constant	5.0	PAL	GENTPA	1597	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate3[kg/yr]	Milk consumption rate for preteen (kg/yr)	constant	160.0	PAL	GENTPA	1598	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate3[kg/yr]	Egg consumption rate for preteen (kg/yr)	constant	2.0	PAL	GENTPA	1599	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime3[hr]	Inhalation exposure time for preteen (hr/yr)	constant	4840.0	PAL	GENTPA	1600	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate3[cm3/s]	Inhalation rate for preteen (cm3/s)	constant	139.0	PAL	GENTPA	1601	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime3[hr]	Soil contamination exposure time for preteen (hr/yr)	constant	3500.0	PAL	GENTPA	1602	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate4[L/yr]	Drinking water consumption rate for teen (L/yr)	lognormal	55.0, 1850.0	PAL	GENTPA	1603	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate4[kg/yr]	Leafy vegetable consumption rate for teen (kg/yr)	constant	6.6	PAL	GENTPA	1604	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate4[kg/yr]	Other vegetable consumption rate for teen (kg/yr)	constant	30.0	PAL	GENTPA	1605	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate4[kg/yr]	Fruit consumption rate for teen (kg/yr)	constant	58.0	PAL	GENTPA	1606	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate4[kg/yr]	Grain consumption rate for teen (kg/yr)	constant	56.0	PAL	GENTPA	1607	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate4[kg/yr]	Beef consumption rate for teen (kg/yr)	constant	10.0	PAL	GENTPA	1608	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate4[kg/yr]	Poultry consumption rate for teen (kg/yr)	constant	5.0	PAL	GENTPA	1609	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate4[kg/yr]	Milk consumption rate for teen (kg/yr)	constant	143.0	PAL	GENTPA	1610	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate4[kg/yr]	Egg consumption rate for teen (kg/yr)	constant	2.0	PAL	GENTPA	1611	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime4[hr]	Inhalation exposure time for teen (hr/yr)	constant	4690.0	PAL	GENTPA	1612	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate4[cm3/s]	Inhalation rate for teen (cm3/s)	constant	185.0	PAL	GENTPA	1613	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime4[hr]	Soil contamination exposure time for teen (hr/yr)	constant	3310.0	PAL	GENTPA	1614	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate5[L/yr]	Drinking water consumption rate for adult:ICRP72 (L/yr)	lognormal	95.0, 2380.0	PAL	GENTPA	1615	CHANGE to 730 (constant) to match YM scenario parameters (from adult:FGR11)
LeafyVegetableConsumptionRate5[kg/yr]	Leafy vegetable consumption rate for adult:ICRP72 (kg/yr)	constant	8.9	PAL	GENTPA	1616	CHANGE to 15 (constant) to match YM scenario parameters (from adult:FGR11)
OtherVegetableConsumptionRate5[kg/yr]	Other vegetable consumption rate for adult:ICRP72 (kg/yr)	constant	41.0	PAL	GENTPA	1617	CHANGE to 7.8 (constant) to match YM scenario parameters (from adult:FGR11)
FruitConsumptionRate5[kg/yr]	Fruit consumption rate for adult:ICRP72 (kg/yr)	constant	52.0	PAL	GENTPA	1618	CHANGE to 16 (constant) to match YM scenario parameters (from adult:FGR11)
GrainConsumptionRate5[kg/yr]	Grain consumption rate for adult:ICRP72 (kg/yr)	constant	50.0	PAL	GENTPA	1619	CHANGE to 0.48 (constant) to match YM scenario parameters (from adult:FGR11)
BeefConsumptionRate5[kg/yr]	Beef consumption rate for adult:ICRP72 (kg/yr)	constant	12.0	PAL	GENTPA	1620	CHANGE to 2.9 (constant) to match YM scenario parameters (from adult:FGR11)
PoultryConsumptionRate5[kg/yr]	Poultry consumption rate for adult:ICRP72 (kg/yr)	constant	6.0	PAL	GENTPA	1621	CHANGE to 0.8 (constant) to match YM scenario parameters (from adult:FGR11)
MilkConsumptionRate5[kg/yr]	Milk consumption rate for adult:ICRP72 (kg/yr)	constant	74.0	PAL	GENTPA	1622	CHANGE to 4.1 (constant) to match YM scenario parameters (from adult:FGR11)
EggConsumptionRate5[kg/yr]	Egg consumption rate for adult:ICRP72 (kg/yr)	constant	2.0	PAL	GENTPA	1623	CHANGE to 6.7 (constant) to match YM scenario parameters (from adult:FGR11)

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InhalationExposureTime5[hr]	Inhalation exposure time for adult:ICRP72 (hr/yr)	constant	6910.0	PAL	GENTPA	1624	CHANGE to 4200 (constant) to match YM scenario parameters (from adult:FGR11)
InhalationRate5[cm3/s]	Inhalation rate for adult:ICRP72 (cm3/s)	constant	176.0	PAL	GENTPA	1625	CHANGE to 270 (constant) to match YM scenario parameters (from adult:FGR11)
SoilContaminationExposureTime5[hr]	Soil contamination exposure time adult:ICRP72 (hr/yr)	constant	3830.0	PAL	GENTPA	1626	CHANGE to 1800 (constant) to match YM scenario parameters (from adult:FGR11)
DrinkingWaterConsumptionRate6[L/yr]	Drinking water consumption rate for adult:FGR11 (L/yr)	constant	730.0	PAL	GENTPA	1627	OK (specified by Part 63)
LeafyVegetableConsumptionRate6[kg/yr]	Leafy vegetable consumption rate for adult:FGR11 (kg/yr)	constant	15.0	PAL	GENTPA	1628	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
OtherVegetableConsumptionRate6[kg/yr]	Other vegetable consumption rate for adult:FGR11 (kg/yr)	constant	7.8	PAL	GENTPA	1629	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
FruitConsumptionRate6[kg/yr]	Fruit consumption rate for adult:FGR11 (kg/yr)	constant	16.0	PAL	GENTPA	1630	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
GrainConsumptionRate6[kg/yr]	Grain consumption rate for adult:FGR11 (kg/yr)	constant	0.48	PAL	GENTPA	1631	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
BeefConsumptionRate6[kg/yr]	Beef consumption rate for adult:FGR11 (kg/yr)	constant	2.9	PAL	GENTPA	1632	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
PoultryConsumptionRate6[kg/yr]	Poultry consumption rate for adult:FGR11 (kg/yr)	constant	0.8	PAL	GENTPA	1633	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
MilkConsumptionRate6[kg/yr]	Milk consumption rate for adult:FGR11 (kg/yr)	constant	4.1	PAL	GENTPA	1634	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
EggConsumptionRate6[kg/yr]	Egg consumption rate for adult:FGR11 (kg/yr)	constant	6.7	PAL	GENTPA	1635	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
InhalationExposureTime6[hr]	Inhalation exposure time for adult:FGR11 (hr/yr)	constant	4200.0	PAL	GENTPA	1636	OK
InhalationRate6[cm3/s]	Inhalation rate for adult:FGR11 (cm3/s)	constant	270.0	PAL	GENTPA	1637	OK -- Value is between sendentary and moderate work activity categories
SoilContaminationExposureTime6[hr]	Soil contamination exposure time adult:FGR11 (hr/yr)	constant	1800.0	PAL	GENTPA	1638	OK
PlantUptakeScaleFactor	Plant uptake scaling factor used to scale plant transfer factors in gftrans.dat	lognormal	0.10, 9.8	PAL	GENTPA	1639	OK
AnimalUptakeScaleFactor	Animal uptake scaling factor used to scale animal transfer factors in gftrans.dat	lognormal	0.10, 9.8	PAL	GENTPA	1640	OK

TPA Input Parameters Related to DOSE3 with Review Team Comments

04/16/2009

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
ReceptorGroup(1=Farming,2=Residential)	ReceptorGroup(1=Member of Farming Community, 2=Residential)	iconstant	1	PAL	DCAGW	1501	OK --Farming community consistent with Part 60
DistanceToReceptorGroup[km]	Distance to receptor group (km)	constant	18.0	PAL	DCAGW	1502	OK -- 18 km consistent with Part 60
PluvialSwitchTime[yr]	Time to switch from non pluvial (current) biosphere climate conditions to pluvial (cooler and wetter)	constant	2000.0	PAL	DCAGW	1511	OK -- consistent with updated climato.dat file which was updated based on DOE climate data
** DCAGW					DCAGW	1500	
** gentpa					GENTPA	1520	
ReceptorAgeGroup(1=Nfnt,2=Tod,3=PTeen,4=Teen,5=Adlt,6=AdltFGR11)	Selection of receptor age group (1=infant, 2=toddler, 3=preteen, 4=teen, 5=adult:ICRP72, and 6=adult:FGR11)	iconstant	6	PAL	GENTPA	1521	TPA code revision to implement ICRP72 is expected to change the name of this parameter to convey selection of radiation dosimetry method and will offer ICRP72 and FGR11 as choices
InterceptionFraction/Irrigate	Irrigation interception fraction	triangular	0.06, 0.4, 0.8	PAL	GENTPA	1522	OK
DepthOfSurfaceSoil[cm]	Depth of surface soil (cm)	constant	15.0	PAL	GENTPA	1523	OK
YearsOfIrrigationPriorToIntakePeriod[yr]	Years of irrigation water deposition prior to the intake period (yr)	iconstant	15	PAL	GENTPA	1524	OK
LeafyVegetableIrrigationRatePB[in/yr]	Leafy vegetable irrigation rate for pluvial biosphere (in/yr)	triangular	14.3, 19.5, 25.7	PAL	GENTPA	1525	OK
OtherVegetableIrrigationRatePB[in/yr]	Other vegetable irrigation rate for pluvial biosphere (in./yr)	triangular	11.1, 24.1, 42.0	PAL	GENTPA	1526	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitIrrigationRatePB[in/yr]	Fruit irrigation rate for pluvial biosphere (in./yr)	triangular	27.4, 39.4, 50.9	PAL	GENTPA	1527	OK
GrainIrrigationRatePB[in/yr]	Grain irrigation rate for pluvial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1528	OK
HomeIrrigationRatePB[in/yr]	Residential irrigation rate for pluvial biosphere (in./yr)	constant	45.0	PAL	GENTPA	1529	OK
PoultryFeedIrrigationRatePB[in/yr]	Poultry feed irrigation rate for pluvial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1530	OK
HenFeedIrrigationRatePB[in/yr]	Egg-laying hen feed irrigation rate for plubial biosphere (in./yr)	triangular	15.9, 21.1, 26.3	PAL	GENTPA	1531	OK
LeafyVegetableIrrigationTimePB[mo/yr]	Leafy vegetable irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1532	Ok
OtherVegetableIrrigationTimePB[mo/yr]	Other vegetable irrigation time for pluvial biosphere (mo/yr)	uniform	2.0, 10.0	PAL	GENTPA	1533	OK
FruitIrrigationTimePB[mo/yr]	Fruit irrigation rate for pluvial biosphere (in./yr)	uniform	2.0, 6.0	PAL	GENTPA	1534	OK
GrainIrrigationTimePB[mo/yr]	Grain irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1535	OK
HomeIrrigationTimePB[mo/yr]	Residential irrigation time for pluvial biosphere (mo/yr)	uniform	9.0, 12.0	PAL	GENTPA	1536	OK
PoultryFeedIrrigationTimePB[mo/yr]	Poultry feed irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1537	OK
HenFeedIrrigationTimePB[mo/yr]	Egg-laying hen feed irrigation time for pluvial biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1538	OK
LeafyVegetableIrrigationRateCB[in/yr]	Leafy vegetable irrigation rate for current biosphere (in./yr)	triangular	20.1, 27.4, 36.2	PAL	GENTPA	1539	OK
OtherVegetableIrrigationRateCB[in/yr]	Other vegetable irrigation rate for current biosphere (in./yr)	triangular	15.7, 34.0, 59.1	PAL	GENTPA	1540	OK
FruitIrrigationRateCB[in/yr]	Fruit irrigation rate for current biosphere (in./yr)	triangular	38.6, 55.5, 71.7	PAL	GENTPA	1541	OK
GrainIrrigationRateCB[in/yr]	Grain irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1542	OK
HomeIrrigationRateCB[in/yr]	Residential irrigation rate for current biosphere (in./yr)	constant	63.4	PAL	GENTPA	1543	OK
PoultryFeedIrrigationRateCB[in/yr]	Poultry feed irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1544	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
HenFeedIrrigationRateCB[in/yr]	Egg-laying hen feed irrigation rate for current biosphere (in./yr)	triangular	22.4, 29.7, 37.0	PAL	GENTPA	1545	OK
LeafyVegetableIrrigationTimeCB[mo/yr]	Leafy vegetable irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1546	OK
OtherVegetableIrrigationTimeCB[mo/yr]	Other vegetable irrigation time for current biosphere (mo/yr)	uniform	2.0, 8.0	PAL	GENTPA	1547	OK
FruitIrrigationTimeCB[mo/yr]	Fruit irrigation rate for current biosphere (in./yr)	uniform	2.0, 3.0	PAL	GENTPA	1548	OK
GrainIrrigationTimeCB[mo/yr]	Grain irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1549	OK
HomeIrrigationTimeCB[mo/yr]	Residential irrigation time for current biosphere (mo/yr)	uniform	6.0, 12.0	PAL	GENTPA	1550	OK
PoultryFeedIrrigationTimeCB[mo/yr]	Poultry feed irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1551	OK
HenFeedIrrigationTimeCB[mo/yr]	Egg-laying hen feed irrigation time for current biosphere (mo/yr)	uniform	6.0, 8.0	PAL	GENTPA	1552	OK
PoultryFeedGrowTime[day]	Poultry feed growing time (day)	uniform	60.0, 90.0	PAL	GENTPA	1553	OK
HenFeedGrowTime[day]	Egg-laying hen feed growing time (day)	uniform	60.0, 90.0	PAL	GENTPA	1554	OK
BeefFreshForageDietFraction	Beef cattle fresh forage diet fraction	normal	0.12, 0.98	PAL	GENTPA	1555	OK
MilkFreshForageDietFraction	Dairy cattle fresh forage diet fraction	normal	0.12, 0.98	PAL	GENTPA	1556	OK
BeefFreshForageGrowTime[day]	Beef cattle fresh forage growing time (day)	uniform	30.0, 62.0	PAL	GENTPA	1557	OK
MilkFreshForageGrowTime[day]	Dairy cattle fresh forage growing time (day)	uniform	30.0, 62.0	PAL	GENTPA	1558	OK
BeefFreshForageIrrigationRatePB[in/yr]	Beef cattle fresh forage irrigation rate for pluvial biosphere (in/yr)	triangular	23.2, 36.8, 54.2	PAL	GENTPA	1559	OK
MilkFreshForageIrrigationRatePB[in/yr]	Milk fresh forage irrigation rate for pluvial biosphere (in./yr)	triangular	23.2, 36.8, 54.2	PAL	GENTPA	1560	OK

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BeefFreshForagelrrigationTimePB[mo/yr]	Beef cattle fresh forage irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1561	OK
MilkFreshForagelrrigationTimePB[mo/yr]	Dairy cattle fresh forage irrigation time for pluvial biosphere (mo/yr)	uniform	3.0, 10.0	PAL	GENTPA	1562	OK
BeefFreshForagelrrigationRateCB[in/yr]	Beef cattle fresh forage irrigation rate for current biosphere (in/yr)	triangular	32.7, 51.8, 76.4	PAL	GENTPA	1563	OK
MilkFreshForagelrrigationRateCB[in/yr]	Dairy cattle fresh forage irrigation rate for current biosphere (in./yr)	triangular	32.7, 51.8, 76.4	PAL	GENTPA	1564	OK
BeefFreshForagelrrigationTimeCB[mo/yr]	Beef cattle fresh forage irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1565	OK
MilkFreshForagelrrigationTimeCB[mo/yr]	Dairy cattle fresh forage irrigation time for current biosphere (mo/yr)	uniform	3.0, 8.0	PAL	GENTPA	1566	OK
DrinkingWaterConsumptionRate1[L/yr]	Drinking water consumption rate for infant (L/yr)	lognormal	12.0, 670.0	PAL	GENTPA	1567	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate1[kg/yr]	Leafy vegetable consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1568	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate1[kg/yr]	Other vegetable consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1569	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate1[kg/yr]	Fruit consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1570	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate1[kg/yr]	Grain consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1571	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate1[kg/yr]	Beef consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1572	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate1[kg/yr]	Poultry consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1573	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate1[kg/yr]	Milk consumption rate for infant (kg/yr)	constant	226.0	PAL	GENTPA	1574	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate1[kg/yr]	Egg consumption rate for infant (kg/yr)	constant	0.0	PAL	GENTPA	1575	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime1[hr]	Inhalation exposure time for infant (hr/yr)	constant	4563.0	PAL	GENTPA	1576	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate1[cm3/s]	Inhalation rate for infant (cm3/s)	constant	52.0	PAL	GENTPA	1577	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime1[hr]	Soil contamination exposure time for infant (hr/yr)	constant	2770.0	PAL	GENTPA	1578	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate2[L/yr]	Drinking water consumption rate for toddler (L/yr)	lognormal	50.0, 1240.0	PAL	GENTPA	1579	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate2[kg/yr]	Leafy vegetable consumption rate for toddler (kg/yr)	constant	3.5	PAL	GENTPA	1580	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate2[kg/yr]	Other vegetable consumption rate for toddler (kg/yr)	constant	16.0	PAL	GENTPA	1581	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate2[kg/yr]	Fruit consumption rate for toddler (kg/yr)	constant	48.0	PAL	GENTPA	1582	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate2[kg/yr]	Grain consumption rate for toddler (kg/yr)	constant	30.0	PAL	GENTPA	1583	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate2[kg/yr]	Beef consumption rate for toddler (kg/yr)	constant	4.0	PAL	GENTPA	1584	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate2[kg/yr]	Poultry consumption rate for toddler (kg/yr)	constant	3.0	PAL	GENTPA	1585	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate2[kg/yr]	Milk consumption rate for toddler (kg/yr)	constant	127.0	PAL	GENTPA	1586	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate2[kg/yr]	Egg consumption rate for toddler (kg/yr)	constant	1.0	PAL	GENTPA	1587	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime2[hr]	Inhalation exposure time for toddler (hr/yr)	constant	4790.0	PAL	GENTPA	1588	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate2[cm3/s]	Inhalation rate for toddler (cm3/s)	constant	88.0	PAL	GENTPA	1589	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime2[hr]	Soil contamination exposure time for toddler (hr/yr)	constant	2620.0	PAL	GENTPA	1590	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate3[L/yr]	Drinking water consumption rate for preteen (L/yr)	lognormal	50.0, 1240.0	PAL	GENTPA	1591	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate3[kg/yr]	Leafy vegetable consumption rate for preteen (kg/yr)	constant	4.8	PAL	GENTPA	1592	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate3[kg/yr]	Other vegetable consumption rate for preteen (kg/yr)	constant	22.0	PAL	GENTPA	1593	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
FruitConsumption Rate3[kg/yr]	Fruit consumption rate for preteen (kg/yr)	constant	52.0	PAL	GENTPA	1594	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate3[kg/yr]	Grain consumption rate for preteen (kg/yr)	constant	49.0	PAL	GENTPA	1595	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate3[kg/yr]	Beef consumption rate for preteen (kg/yr)	constant	6.0	PAL	GENTPA	1596	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate3[kg/yr]	Poultry consumption rate for preteen (kg/yr)	constant	5.0	PAL	GENTPA	1597	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate3[kg/yr]	Milk consumption rate for preteen (kg/yr)	constant	160.0	PAL	GENTPA	1598	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate3[kg/yr]	Egg consumption rate for preteen (kg/yr)	constant	2.0	PAL	GENTPA	1599	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

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InhalationExposureTime3[hr]	Inhalation exposure time for preteen (hr/yr)	constant	4840.0	PAL	GENTPA	1600	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate3[cm3/s]	Inhalation rate for preteen (cm3/s)	constant	139.0	PAL	GENTPA	1601	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime3[hr]	Soil contamination exposure time for preteen (hr/yr)	constant	3500.0	PAL	GENTPA	1602	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate4[L/yr]	Drinking water consumption rate for teen (L/yr)	lognormal	55.0, 1850.0	PAL	GENTPA	1603	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
LeafyVegetableConsumptionRate4[kg/yr]	Leafy vegetable consumption rate for teen (kg/yr)	constant	6.6	PAL	GENTPA	1604	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
OtherVegetableConsumptionRate4[kg/yr]	Other vegetable consumption rate for teen (kg/yr)	constant	30.0	PAL	GENTPA	1605	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

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FruitConsumption Rate4[kg/yr]	Fruit consumption rate for teen (kg/yr)	constant	58.0	PAL	GENTPA	1606	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
GrainConsumptio nRate4[kg/yr]	Grain consumption rate for teen (kg/yr)	constant	56.0	PAL	GENTPA	1607	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
BeefConsumption Rate4[kg/yr]	Beef consumption rate for teen (kg/yr)	constant	10.0	PAL	GENTPA	1608	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
PoultryConsumpti onRate4[kg/yr]	Poultry consumption rate for teen (kg/yr)	constant	5.0	PAL	GENTPA	1609	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
MilkConsumption Rate4[kg/yr]	Milk consumption rate for teen (kg/yr)	constant	143.0	PAL	GENTPA	1610	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
EggConsumption Rate4[kg/yr]	Egg consumption rate for teen (kg/yr)	constant	2.0	PAL	GENTPA	1611	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
InhalationExposureTime4[hr]	Inhalation exposure time for teen (hr/yr)	constant	4690.0	PAL	GENTPA	1612	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
InhalationRate4[cm3/s]	Inhalation rate for teen (cm3/s)	constant	185.0	PAL	GENTPA	1613	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
SoilContaminationExposureTime4[hr]	Soil contamination exposure time for teen (hr/yr)	constant	3310.0	PAL	GENTPA	1614	DELETE: Code changes to implement ICRP72 dosimetry is expected to involve deletion of all non-adult age dependent input parameters (Part 63 requires adult dosimetry so age depdendent calculations not needed) to clean up tpa.inp of obsolete parameters.
DrinkingWaterConsumptionRate5[L/yr]	Drinking water consumption rate for adult:ICRP72 (L/yr)	lognormal	95.0, 2380.0	PAL	GENTPA	1615	CHANGE to 730 (constant) to match YM scenario parameters (from adult:FGR11)
LeafyVegetableConsumptionRate5[kg/yr]	Leafy vegetable consumption rate for adult:ICRP72 (kg/yr)	constant	8.9	PAL	GENTPA	1616	CHANGE to 15 (constant) to match YM scenario parameters (from adult:FGR11)
OtherVegetableConsumptionRate5[kg/yr]	Other vegetable consumption rate for adult:ICRP72 (kg/yr)	constant	41.0	PAL	GENTPA	1617	CHANGE to 7.8 (constant) to match YM scenario parameters (from adult:FGR11)
FruitConsumptionRate5[kg/yr]	Fruit consumption rate for adult:ICRP72 (kg/yr)	constant	52.0	PAL	GENTPA	1618	CHANGE to 16 (constant) to match YM scenario parameters (from adult:FGR11)
GrainConsumptionRate5[kg/yr]	Grain consumption rate for adult:ICRP72 (kg/yr)	constant	50.0	PAL	GENTPA	1619	CHANGE to 0.48 (constant) to match YM scenario parameters (from adult:FGR11)
BeefConsumptionRate5[kg/yr]	Beef consumption rate for adult:ICRP72 (kg/yr)	constant	12.0	PAL	GENTPA	1620	CHANGE to 2.9 (constant) to match YM scenario parameters (from adult:FGR11)
PoultryConsumptionRate5[kg/yr]	Poultry consumption rate for adult:ICRP72 (kg/yr)	constant	6.0	PAL	GENTPA	1621	CHANGE to 0.8 (constant) to match YM scenario parameters (from adult:FGR11)
MilkConsumptionRate5[kg/yr]	Milk consumption rate for adult:ICRP72 (kg/yr)	constant	74.0	PAL	GENTPA	1622	CHANGE to 4.1 (constant) to match YM scenario parameters (from adult:FGR11)
EggConsumptionRate5[kg/yr]	Egg consumption rate for adult:ICRP72 (kg/yr)	constant	2.0	PAL	GENTPA	1623	CHANGE to 6.7 (constant) to match YM scenario parameters (from adult:FGR11)

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InhalationExposureTime5[hr]	Inhalation exposure time for adult:ICRP72 (hr/yr)	constant	6910.0	PAL	GENTPA	1624	CHANGE to 4200 (constant) to match YM scenario parameters (from adult:FGR11)
InhalationRate5[cm3/s]	Inhalation rate for adult:ICRP72 (cm3/s)	constant	176.0	PAL	GENTPA	1625	CHANGE to 270 (constant) to match YM scenario parameters (from adult:FGR11)
SoilContaminationExposureTime5[hr]	Soil contamination exposure time adult:ICRP72 (hr/yr)	constant	3830.0	PAL	GENTPA	1626	CHANGE to 1800 (constant) to match YM scenario parameters (from adult:FGR11)
DrinkingWaterConsumptionRate6[L/yr]	Drinking water consumption rate for adult:FGR11 (L/yr)	constant	730.0	PAL	GENTPA	1627	OK (specified by Part 63)
LeafyVegetableConsumptionRate6[kg/yr]	Leafy vegetable consumption rate for adult:FGR11 (kg/yr)	constant	15.0	PAL	GENTPA	1628	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
OtherVegetableConsumptionRate6[kg/yr]	Other vegetable consumption rate for adult:FGR11 (kg/yr)	constant	7.8	PAL	GENTPA	1629	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
FruitConsumptionRate6[kg/yr]	Fruit consumption rate for adult:FGR11 (kg/yr)	constant	16.0	PAL	GENTPA	1630	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
GrainConsumptionRate6[kg/yr]	Grain consumption rate for adult:FGR11 (kg/yr)	constant	0.48	PAL	GENTPA	1631	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
BeefConsumptionRate6[kg/yr]	Beef consumption rate for adult:FGR11 (kg/yr)	constant	2.9	PAL	GENTPA	1632	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	DOSE3 Team Input 3/18/05
PoultryConsumptionRate6[kg/yr]	Poultry consumption rate for adult:FGR11 (kg/yr)	constant	0.8	PAL	GENTPA	1633	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
MilkConsumptionRate6[kg/yr]	Milk consumption rate for adult:FGR11 (kg/yr)	constant	4.1	PAL	GENTPA	1634	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
EggConsumptionRate6[kg/yr]	Egg consumption rate for adult:FGR11 (kg/yr)	constant	6.7	PAL	GENTPA	1635	OK -- Mean annual consumption for residents of Amargosa Valley that consume local produce. DOE has changed averaging approach to mean of entire population but there is no reason for us to follow their approach
InhalationExposureTime6[hr]	Inhalation exposure time for adult:FGR11 (hr/yr)	constant	4200.0	PAL	GENTPA	1636	OK
InhalationRate6[cm3/s]	Inhalation rate for adult:FGR11 (cm3/s)	constant	270.0	PAL	GENTPA	1637	OK -- Value is between sendentary and moderate work activity categories
SoilContaminationExposureTime6[hr]	Soil contamination exposure time adult:FGR11 (hr/yr)	constant	1800.0	PAL	GENTPA	1638	OK
PlantUptakeScaleFactor	Plant uptake scaling factor used to scale plant transfer factors in gftrans.dat	lognormal	0.10, 9.8	PAL	GENTPA	1639	OK
AnimalUptakeScaleFactor	Animal uptake scaling factor used to scale animal transfer factors in gftrans.dat	lognormal	0.10, 9.8	PAL	GENTPA	1640	OK

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** ASHREMOB	ASHREMOB	1326	
** ASHRMOVO	ASHRMOVO	1248	
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** FAULTO	FAULTO	1196	
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** Simulation Times	SETUP	52	
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AirborneMassLoadAboveFreshAshBlanketLightDisturbance[g/m3]	DCAGS	1315	
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AirborneMassLoadInsideHeavyDisturbance[g/m3]	DCAGS	1318	
AirborneMassLoadInsideLightDisturbance[g/m3]	DCAGS	1319	
AirborneMassLoadOffsite[g/m3]	DCAGS	1320	
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AlluviumMatrixPoreRadius_SAV[m]	SZFT	1019	
AlluviumMatrixPorosity_SAV	SZFT	1016	
AlluviumMatrixRD_SAV_C	SZFT	1002	
AlluviumMatrixRD_SAV_Cl	SZFT	990	
AlluviumMatrixRD_SAV_Cm	SZFT	992	
AlluviumMatrixRD_SAV_Cs	SZFT	998	
AlluviumMatrixRD_SAV_I	SZFT	986	
AlluviumMatrixRD_SAV_Nb	SZFT	1006	
AlluviumMatrixRD_SAV_Ni	SZFT	1000	
AlluviumMatrixRD_SAV_Pb	SZFT	996	
AlluviumMatrixRD_SAV_Ra	SZFT	994	
AlluviumMatrixRD_SAV_Se	SZFT	1004	

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BFw_Thickness_1SubArea[m]	UZFT	911	
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BulkingFactorRockTypeOneSubarea_2[]	SEISMO	335	
BulkingFactorRockTypeOneSubarea_3[]	SEISMO	336	
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BulkingFactorRockTypeTwoSubarea_6[]	SEISMO	349	
BulkingFactorRockTypeTwoSubarea_7[]	SEISMO	350	
BulkingFactorRockTypeTwoSubarea_8[]	SEISMO	351	
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CH_Total_Thickness_3SubArea[m]	UZFT	922	
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CH_Total_Thickness_5SubArea[m]	UZFT	936	
CH_Total_Thickness_6SubArea[m]	UZFT	943	
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CHnvThickness_4SubArea[m]	UZFT	928	
CHnvThickness_5SubArea[m]	UZFT	935	
CHnvThickness_6SubArea[m]	UZFT	942	
CHnvThickness_7SubArea[m]	UZFT	949	
CHnvThickness_8SubArea[m]	UZFT	956	
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DripShieldBucklingLoadSubarea_5[kg/m]	SEISMO	418	
DripShieldBucklingLoadSubarea_6[kg/m]	SEISMO	419	
DripShieldBucklingLoadSubarea_7[kg/m]	SEISMO	420	
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EnvironmentII_NO3[mol/L]	NFENV	105	
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EnvironmentII_SO4[mol/L]	NFENV	107	
EnvironmentII_Wastepackage_DeltaECrit[VSHE]	NFENV	108	
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EnvironmentIII_CO3[mol/L]	NFENV	113	
EnvironmentIII_Fl[mol/L]	NFENV	109	
EnvironmentIII_NO3[mol/L]	NFENV	112	
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FractionRockTypeOneInSubarea_10[]	SEISMO	333	
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FractureAperture_PPw_[m]	UZFT	857	
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FractureAperture_UFZ_[m]	UZFT	860	
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FractureBeta_CHnv	UZFT	848	
FractureBeta_CHnz	UZFT	849	
FractureBeta_PPw_	UZFT	850	
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FractureColloidConcentration_CHnv[kg/m3]	UZFT	883	
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FractureColloidConcentration_PPw_[kg/m3]	UZFT	885	
FractureColloidConcentration_TSw_[kg/m3]	UZFT	882	
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FractureColloidRetardationFactor_CHnv[m3/kg]	UZFT	869	
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FractureColloidRetardationFactor_PPw_[m3/kg]	UZFT	871	
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FracturePermeability_BFw_[m2]	UZFT	838	
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FracturePermeability_CHnz[m2]	UZFT	835	
FracturePermeability_PPw_[m2]	UZFT	836	
FracturePermeability_TSw_[m2]	UZFT	833	
FracturePermeability_UCF_[m2]	UZFT	837	
FracturePermeability_UFZ_[m2]	UZFT	839	
FracturePorosity_BFw_	UZFT	845	
FracturePorosity_CHnv	UZFT	841	
FracturePorosity_CHnz	UZFT	842	
FracturePorosity_PPw_	UZFT	843	
FracturePorosity_STFF	SZFT	1013	
FracturePorosity_TSw_	UZFT	840	
FracturePorosity_UCF_	UZFT	844	
FracturePorosity_UFZ_	UZFT	846	
FractureRD_BFw_C	UZFT	782	
FractureRD_BFw_Cl	UZFT	740	
FractureRD_BFw_Cm	UZFT	747	
FractureRD_BFw_Cs	UZFT	768	
FractureRD_BFw_I	UZFT	726	
FractureRD_BFw_Nb	UZFT	796	
FractureRD_BFw_Ni	UZFT	775	
FractureRD_BFw_Pb	UZFT	761	
FractureRD_BFw_Ra	UZFT	754	
FractureRD_BFw_Se	UZFT	789	
FractureRD_BFw_Tc	UZFT	733	
FractureRD_CHnvC	UZFT	778	
FractureRD_CHnvCl	UZFT	736	
FractureRD_CHnvCm	UZFT	743	
FractureRD_CHnvCs	UZFT	764	
FractureRD_CHnvI	UZFT	722	
FractureRD_CHnvNb	UZFT	792	
FractureRD_CHnvNi	UZFT	771	
FractureRD_CHnvPb	UZFT	757	
FractureRD_CHnvRa	UZFT	750	
FractureRD_CHnvSe	UZFT	785	
FractureRD_CHnvTc	UZFT	729	
FractureRD_CHnzC	UZFT	779	
FractureRD_CHnzCl	UZFT	737	
FractureRD_CHnzCm	UZFT	744	
FractureRD_CHnzCs	UZFT	765	
FractureRD_CHnzI	UZFT	723	
FractureRD_CHnzNb	UZFT	793	
FractureRD_CHnzNi	UZFT	772	
FractureRD_CHnzPb	UZFT	758	
FractureRD_CHnzRa	UZFT	751	
FractureRD_CHnzSe	UZFT	786	
FractureRD_CHnzTc	UZFT	730	
FractureRD_PPw_C	UZFT	780	
FractureRD_PPw_Cl	UZFT	738	
FractureRD_PPw_Cm	UZFT	745	
FractureRD_PPw_Cs	UZFT	766	
FractureRD_PPw_I	UZFT	724	
FractureRD_PPw_Nb	UZFT	794	
FractureRD_PPw_Ni	UZFT	773	
FractureRD_PPw_Pb	UZFT	759	
FractureRD_PPw_Ra	UZFT	752	

FractureRD_PPw_Se	UZFT	787	
FractureRD_PPw_Tc	UZFT	731	
FractureRD_STFF_C	SZFT	1001	
FractureRD_STFF_Cl	SZFT	989	
FractureRD_STFF_Cm	SZFT	991	
FractureRD_STFF_Cs	SZFT	997	
FractureRD_STFF_I	SZFT	985	
FractureRD_STFF_Nb	SZFT	1005	
FractureRD_STFF_Ni	SZFT	999	
FractureRD_STFF_Pb	SZFT	995	
FractureRD_STFF_Ra	SZFT	993	
FractureRD_STFF_Se	SZFT	1003	
FractureRD_STFF_Tc	SZFT	987	
FractureRD_TSw_C	UZFT	777	
FractureRD_TSw_Cl	UZFT	735	
FractureRD_TSw_Cm	UZFT	742	
FractureRD_TSw_Cs	UZFT	763	
FractureRD_TSw_I	UZFT	721	
FractureRD_TSw_Nb	UZFT	791	
FractureRD_TSw_Ni	UZFT	770	
FractureRD_TSw_Pb	UZFT	756	
FractureRD_TSw_Ra	UZFT	749	
FractureRD_TSw_Se	UZFT	784	
FractureRD_TSw_Tc	UZFT	728	
FractureRD_UCF_C	UZFT	781	
FractureRD_UCF_Cl	UZFT	739	
FractureRD_UCF_Cm	UZFT	746	
FractureRD_UCF_Cs	UZFT	767	
FractureRD_UCF_I	UZFT	725	
FractureRD_UCF_Nb	UZFT	795	
FractureRD_UCF_Ni	UZFT	774	
FractureRD_UCF_Pb	UZFT	760	
FractureRD_UCF_Ra	UZFT	753	
FractureRD_UCF_Se	UZFT	788	
FractureRD_UCF_Tc	UZFT	732	
FractureRD_UFZ_C	UZFT	783	
FractureRD_UFZ_Cl	UZFT	741	
FractureRD_UFZ_Cm	UZFT	748	
FractureRD_UFZ_Cs	UZFT	769	
FractureRD_UFZ_I	UZFT	727	
FractureRD_UFZ_Nb	UZFT	797	
FractureRD_UFZ_Ni	UZFT	776	
FractureRD_UFZ_Pb	UZFT	762	
FractureRD_UFZ_Ra	UZFT	755	
FractureRD_UFZ_Se	UZFT	790	
FractureRD_UFZ_Tc	UZFT	734	
FracturesPerMeter_STFF[1/m]	SZFT	979	
FractureToughness[MPa-m**0.5]	EBSFAIL	269	
FruitConsumptionRate1[kg/yr]	GENTPA	1104	
FruitConsumptionRate2[kg/yr]	GENTPA	1116	
FruitConsumptionRate3[kg/yr]	GENTPA	1128	
FruitConsumptionRate4[kg/yr]	GENTPA	1140	
FruitConsumptionRate5[kg/yr]	GENTPA	1152	
FruitConsumptionRate6[kg/yr]	GENTPA	1164	
FruitIrrigationRateCB[in/yr]	GENTPA	1075	
FruitIrrigationRatePB[in/yr]	GENTPA	1061	
FruitIrrigationTimeCB[mo/yr]	GENTPA	1082	
FruitIrrigationTimePB[mo/yr]	GENTPA	1068	

FuelRadiusInRod[m]	Cladding	578	
FuelRodHalfLength[m]	Cladding	577	
GapAndGrainBoundaryInventoryPerKgSF[ci]	EBSREL	496	
GapFractionForAM241	EBSREL	471	
GapFractionForAM243	EBSREL	473	
GapFractionForC14	EBSREL	485	
GapFractionForCL36	EBSREL	484	
GapFractionForCM245	EBSREL	470	
GapFractionForCM246	EBSREL	468	
GapFractionForCS135	EBSREL	480	
GapFractionForI129	EBSREL	481	
GapFractionForNB94	EBSREL	487	
GapFractionForNI59	EBSREL	483	
GapFractionForNP237	EBSREL	472	
GapFractionForPB210	EBSREL	479	
GapFractionForPU239	EBSREL	474	
GapFractionForPU240	EBSREL	475	
GapFractionForRA226	EBSREL	478	
GapFractionForSE79	EBSREL	486	
GapFractionForTC99	EBSREL	482	
GapFractionForTH230	EBSREL	477	
GapFractionForU234	EBSREL	476	
GapFractionForU238	EBSREL	469	
GenerateRestartFiles(yes=1,no=0)	Globals	2	
GlassActivationEnergyHighRange[kJ/mol-K]	Glass	584	
GlassActivationEnergyLowRange[kJ/mol-K]	Glass	587	
GrainBoundaryThickness[micrometer]	EBSFAIL	229	
GrainConsumptionRate1[kg/yr]	GENTPA	1105	
GrainConsumptionRate2[kg/yr]	GENTPA	1117	
GrainConsumptionRate3[kg/yr]	GENTPA	1129	
GrainConsumptionRate4[kg/yr]	GENTPA	1141	
GrainConsumptionRate5[kg/yr]	GENTPA	1153	
GrainConsumptionRate6[kg/yr]	GENTPA	1165	
GrainIrrigationRateCB[in/yr]	GENTPA	1076	
GrainIrrigationRatePB[in/yr]	GENTPA	1062	
GrainIrrigationTimeCB[mo/yr]	GENTPA	1083	
GrainIrrigationTimePB[mo/yr]	GENTPA	1069	
GroundAccelerationInitialRockTypeOneSubarea_1[pga]	SEISMO	374	
GroundAccelerationInitialRockTypeOneSubarea_10[pga]	SEISMO	383	
GroundAccelerationInitialRockTypeOneSubarea_2[pga]	SEISMO	375	
GroundAccelerationInitialRockTypeOneSubarea_3[pga]	SEISMO	376	
GroundAccelerationInitialRockTypeOneSubarea_4[pga]	SEISMO	377	
GroundAccelerationInitialRockTypeOneSubarea_5[pga]	SEISMO	378	
GroundAccelerationInitialRockTypeOneSubarea_6[pga]	SEISMO	379	
GroundAccelerationInitialRockTypeOneSubarea_7[pga]	SEISMO	380	
GroundAccelerationInitialRockTypeOneSubarea_8[pga]	SEISMO	381	
GroundAccelerationInitialRockTypeOneSubarea_9[pga]	SEISMO	382	
GroundAccelerationInitialRockTypeTwoSubarea_1[pga]	SEISMO	384	
GroundAccelerationInitialRockTypeTwoSubarea_10[pga]	SEISMO	393	
GroundAccelerationInitialRockTypeTwoSubarea_2[pga]	SEISMO	385	
GroundAccelerationInitialRockTypeTwoSubarea_3[pga]	SEISMO	386	
GroundAccelerationInitialRockTypeTwoSubarea_4[pga]	SEISMO	387	
GroundAccelerationInitialRockTypeTwoSubarea_5[pga]	SEISMO	388	
GroundAccelerationInitialRockTypeTwoSubarea_6[pga]	SEISMO	389	
GroundAccelerationInitialRockTypeTwoSubarea_7[pga]	SEISMO	390	
GroundAccelerationInitialRockTypeTwoSubarea_8[pga]	SEISMO	391	
GroundAccelerationInitialRockTypeTwoSubarea_9[pga]	SEISMO	392	
GroundAccelerationMaximumRockTypeOneSubarea_1[pga]	SEISMO	394	

GroundAccelerationMaximumRockTypeOneSubarea_10[pga]	SEISMO	403	
GroundAccelerationMaximumRockTypeOneSubarea_2[pga]	SEISMO	395	
GroundAccelerationMaximumRockTypeOneSubarea_3[pga]	SEISMO	396	
GroundAccelerationMaximumRockTypeOneSubarea_4[pga]	SEISMO	397	
GroundAccelerationMaximumRockTypeOneSubarea_5[pga]	SEISMO	398	
GroundAccelerationMaximumRockTypeOneSubarea_6[pga]	SEISMO	399	
GroundAccelerationMaximumRockTypeOneSubarea_7[pga]	SEISMO	400	
GroundAccelerationMaximumRockTypeOneSubarea_8[pga]	SEISMO	401	
GroundAccelerationMaximumRockTypeOneSubarea_9[pga]	SEISMO	402	
GroundAccelerationMaximumRockTypeTwoSubarea_1[pga]	SEISMO	404	
GroundAccelerationMaximumRockTypeTwoSubarea_10[pga]	SEISMO	413	
GroundAccelerationMaximumRockTypeTwoSubarea_2[pga]	SEISMO	405	
GroundAccelerationMaximumRockTypeTwoSubarea_3[pga]	SEISMO	406	
GroundAccelerationMaximumRockTypeTwoSubarea_4[pga]	SEISMO	407	
GroundAccelerationMaximumRockTypeTwoSubarea_5[pga]	SEISMO	408	
GroundAccelerationMaximumRockTypeTwoSubarea_6[pga]	SEISMO	409	
GroundAccelerationMaximumRockTypeTwoSubarea_7[pga]	SEISMO	410	
GroundAccelerationMaximumRockTypeTwoSubarea_8[pga]	SEISMO	411	
GroundAccelerationMaximumRockTypeTwoSubarea_9[pga]	SEISMO	412	
GroundSurfaceTemperature[C]	NFENV	160	
GroundwaterProtectionCalc(yes=1,no=0)	Groundwater Protection	66	
HenFeedGrowTime[day]	GENTPA	1088	
HenFeedIrrigationRateCB[in/yr]	GENTPA	1079	
HenFeedIrrigationRatePB[in/yr]	GENTPA	1065	
HenFeedIrrigationTimeCB[mo/yr]	GENTPA	1086	
HenFeedIrrigationTimePB[mo/yr]	GENTPA	1072	
HomeIrrigationRateCB[in/yr]	GENTPA	1077	
HomeIrrigationRatePB[in/yr]	GENTPA	1063	
HomeIrrigationTimeCB[mo/yr]	GENTPA	1084	
HomeIrrigationTimePB[mo/yr]	GENTPA	1070	
HumidAirCorrosionRate[m/yr]	EBSFAIL	256	
ImmobileGrainDensity_STFF[kg/m3]	SZFT	1031	
ImmobilePoreRadius_STFF[m]	SZFT	1033	
ImmobilePorosity_STFF	SZFT	1032	
ImmobilePorosityPenetrationFraction_STFF	SZFT	978	
ImmobileRd_STFF_C	SZFT	1028	
ImmobileRd_STFF_Cl	SZFT	1022	
ImmobileRd_STFF_Cm	SZFT	1023	
ImmobileRd_STFF_Cs	SZFT	1026	
ImmobileRd_STFF_I	SZFT	1020	
ImmobileRd_STFF_Nb	SZFT	1030	
ImmobileRd_STFF_Ni	SZFT	1027	
ImmobileRd_STFF_Pb	SZFT	1025	
ImmobileRd_STFF_Ra	SZFT	1024	
ImmobileRd_STFF_Se	SZFT	1029	
ImmobileRd_STFF_Tc	SZFT	1021	
IModel	EBSREL	447	
ImportanceAnalysisFlag(yes=1,no=0)	Importance Analysis	4	
IncorporationRatio	ASHPLUMO	1240	
IndoorShieldingFactor	DCAGS	1313	
InhalationExposureTime1[hr]	GENTPA	1110	
InhalationExposureTime2[hr]	GENTPA	1122	
InhalationExposureTime3[hr]	GENTPA	1134	
InhalationExposureTime4[hr]	GENTPA	1146	
InhalationExposureTime5[hr]	GENTPA	1158	
InhalationExposureTime6[hr]	GENTPA	1170	
InhalationRate1[cm3/s]	GENTPA	1111	
InhalationRate2[cm3/s]	GENTPA	1123	

InhalationRate3[cm3/s]	GENTPA	1135	
InhalationRate4[cm3/s]	GENTPA	1147	
InhalationRate5[cm3/s]	GENTPA	1159	
InhalationRate6[cm3/s]	GENTPA	1171	
InitialFailureTime[yr]	EBSREL	437	
InitialRadiusOfSFParticles[m]	EBSREL	488	
InletArea__1SubArea[m2]	UZFT	896	
InletArea__2SubArea[m2]	UZFT	897	
InletArea__3SubArea[m2]	UZFT	898	
InletArea__4SubArea[m2]	UZFT	899	
InletArea__5SubArea[m2]	UZFT	900	
InletArea__6SubArea[m2]	UZFT	901	
InletArea__7SubArea[m2]	UZFT	902	
InletArea__8SubArea[m2]	UZFT	903	
InletArea__9SubArea[m2]	UZFT	904	
InletArea_10SubArea[m2]	UZFT	905	
InnerActivationEnergyPassiveCurrDens[J/mol]	EBSFAIL	207	
InnerActivationEnergyReductionReactHighpH[J/mole]	EBSFAIL	202	
InnerActivationEnergyReductionReactLowpH[J/mole]	EBSFAIL	203	
InnerChargeTransferCoefReductionReactHighpH	EBSFAIL	198	
InnerChargeTransferCoefReductionReactLowpH	EBSFAIL	199	
InnerDeltaEcritInh[mV]	EBSFAIL	216	
InnerEffectiveReactionOrderHHighpH	EBSFAIL	204	
InnerEffectiveReactionOrderHLowpH	EBSFAIL	205	
InnerInhibitingCarbonateToCl	EBSFAIL	214	
InnerInhibitingNitrateToCl	EBSFAIL	213	
InnerInhibitingSulfateToCl	EBSFAIL	215	
InnerOverpackErpIntercept	EBSFAIL	239	
InnerOverpackErpSlope	EBSFAIL	241	
InnerReferenceCurrReductionReactHighpH[C/(m2*yr)]	EBSFAIL	200	
InnerReferenceCurrReductionReactLowpH[C/(m2*yr)]	EBSFAIL	201	
InnerWPActivationEnergyforWaterReduction[J/mole]	EBSFAIL	248	
InnerWPBetaKineticsParameterforWater	EBSFAIL	244	
InnerWPRateConstantforWaterReduction[coulomb-m/m^2/yr]	EBSFAIL	247	
InnerWPThickness[m]	EBSFAIL	227	
InterceptionFraction/Irrigate	GENTPA	1056	
InternalFilmCrossSectionalArea[m^2]	Diffusion	593	
InvertBypass(0=ebsfilt,1=bypass-ebsfilt)	EBSFILT	624	
InvertDiffusionCoefficient[m^2/yr]	EBSFILT	627	
InvertHeight[m]	SEISMO	287	
InvertMatrixPermeability[m^2]	EBSFILT	628	
InvertRockPorosity	EBSFILT	625	
InvertThickness[m]	EBSFILT	626	
IrreversibleColloidModel[0=no,1=yes]	EBSFILT	629	
KD_Soil_Am[cm3/g]	GENTPA	1178	
KD_Soil_C[cm3/g]	GENTPA	1188	
KD_Soil_Cl[cm3/g]	GENTPA	1187	
KD_Soil_Cm[cm3/g]	GENTPA	1175	
KD_Soil_Cs[cm3/g]	GENTPA	1183	
KD_Soil_I[cm3/g]	GENTPA	1184	
KD_Soil_Nb[cm3/g]	GENTPA	1190	
KD_Soil_Ni[cm3/g]	GENTPA	1186	
KD_Soil_Np[cm3/g]	GENTPA	1179	
KD_Soil_Pb[cm3/g]	GENTPA	1182	
KD_Soil_Pu[cm3/g]	GENTPA	1176	
KD_Soil_Ra[cm3/g]	GENTPA	1181	
KD_Soil_Se[cm3/g]	GENTPA	1189	
KD_Soil_Tc[cm3/g]	GENTPA	1185	

KD_Soil_Th[cm3/g]	GENTPA	1180	
KD_Soil_U[cm3/g]	GENTPA	1177	
KdOfActiniumInVolcanicAsh[cm3/g]	ASHRMOVO	1265	
KdOfAmericiumInVolcanicAsh[cm3/g]	ASHRMOVO	1260	
KdOfCarbonInVolcanicAsh[cm3/g]	ASHRMOVO	1281	
KdOfCesiumInVolcanicAsh[cm3/g]	ASHRMOVO	1268	
KdOfChlorineInVolcanicAsh[cm3/g]	ASHRMOVO	1280	
KdOfCuriumInVolcanicAsh[cm3/g]	ASHRMOVO	1258	
KdOfIodineInVolcanicAsh[cm3/g]	ASHRMOVO	1269	
KdOfLeadInVolcanicAsh[cm3/g]	ASHRMOVO	1263	
KdOfMolybdenumInVolcanicAsh[cm3/g]	ASHRMOVO	1274	
KdOfNeptuniumInVolcanicAsh[cm3/g]	ASHRMOVO	1266	
KdOfNickelInVolcanicAsh[cm3/g]	ASHRMOVO	1279	
KdOfNiobiumInVolcanicAsh[cm3/g]	ASHRMOVO	1275	
KdOfPaladiumInVolcanicAsh[cm3/g]	ASHRMOVO	1272	
KdOfPlutoniumInVolcanicAsh[cm3/g]	ASHRMOVO	1259	
KdOfProtactiniumInVolcanicAsh[cm3/g]	ASHRMOVO	1264	
KdOfRadiumInVolcanicAsh[cm3/g]	ASHRMOVO	1262	
KdOfSamariumInVolcanicAsh[cm3/g]	ASHRMOVO	1267	
KdOfSeleniumInVolcanicAsh[cm3/g]	ASHRMOVO	1278	
KdOfSilverInVolcanicAsh[cm3/g]	ASHRMOVO	1271	
KdOfStrontiumInVolcanicAsh[cm3/g]	ASHRMOVO	1277	
KdOfTechnetiumInVolcanicAsh[cm3/g]	ASHRMOVO	1273	
KdOfThoriumInVolcanicAsh[cm3/g]	ASHRMOVO	1261	
KdOfTinInVolcanicAsh[cm3/g]	ASHRMOVO	1270	
KdOfUraniumInVolcanicAsh[cm3/g]	ASHRMOVO	1257	
KdOfZirconiumInVolcanicAsh[cm3/g]	ASHRMOVO	1276	
KinematicViscosity[m^2/s]	NFENV	85	
LatinHypercubeSampling(yes=1,no=0)	Sampling	47	
LeafyVegetableConsumptionRate1[kg/yr]	GENTPA	1102	
LeafyVegetableConsumptionRate2[kg/yr]	GENTPA	1114	
LeafyVegetableConsumptionRate3[kg/yr]	GENTPA	1126	
LeafyVegetableConsumptionRate4[kg/yr]	GENTPA	1138	
LeafyVegetableConsumptionRate5[kg/yr]	GENTPA	1150	
LeafyVegetableConsumptionRate6[kg/yr]	GENTPA	1162	
LeafyVegetableIrrigationRateCB[in/yr]	GENTPA	1073	
LeafyVegetableIrrigationRatePB[in/yr]	GENTPA	1059	
LeafyVegetableIrrigationTimeCB[mo/yr]	GENTPA	1080	
LeafyVegetableIrrigationTimePB[mo/yr]	GENTPA	1066	
LengthOfFilmPathInsideWP[m]	Diffusion	592	
LengthOfRefluxZone[m]	NFENV	136	
LengthOfVolcanicDike[m]	VOLCANO	1221	
LogCO2PartialPressure_AllUZ_SZLayers[atm]	UZFT	635	
LogOfGlassDissolutionConstantHighRange[]	Glass	582	
LogOfGlassDissolutionConstantLowRange[]	Glass	585	
MassDensityofYMRock[kg/m^3]	NFENV	161	
MatrixBeta_BFw_	UZFT	817	
MatrixBeta_CHnv	UZFT	813	
MatrixBeta_CHnz	UZFT	814	
MatrixBeta_PPw_	UZFT	815	
MatrixBeta_TSw_	UZFT	812	
MatrixBeta_UCF_	UZFT	816	
MatrixBeta_UFZ_	UZFT	818	
MatrixColloidConcentration_BFw_[kg/m3]	UZFT	894	
MatrixColloidConcentration_CHnv[kg/m3]	UZFT	890	
MatrixColloidConcentration_Chnz[kg/m3]	UZFT	891	
MatrixColloidConcentration_PPw_[kg/m3]	UZFT	892	
MatrixColloidConcentration_TSw_[kg/m3]	UZFT	889	

MatrixColloidConcentration_UCF_[kg/m3]	UZFT	893	
MatrixColloidConcentration_UFZ_[kg/m3]	UZFT	895	
MatrixColloidRetardationFactor_BFw_[m3/kg]	UZFT	880	
MatrixColloidRetardationFactor_CHnv[m3/kg]	UZFT	876	
MatrixColloidRetardationFactor_CHnz[m3/kg]	UZFT	877	
MatrixColloidRetardationFactor_PPw_[m3/kg]	UZFT	878	
MatrixColloidRetardationFactor_TSw_[m3/kg]	UZFT	875	
MatrixColloidRetardationFactor_UCF_[m3/kg]	UZFT	879	
MatrixColloidRetardationFactor_UFZ_[m3/kg]	UZFT	881	
MatrixGrainDensity_BFw_[kg/m3]	UZFT	824	
MatrixGrainDensity_CHnv[kg/m3]	UZFT	820	
MatrixGrainDensity_CHnz[kg/m3]	UZFT	821	
MatrixGrainDensity_PPw_[kg/m3]	UZFT	822	
MatrixGrainDensity_TSw_[kg/m3]	UZFT	819	
MatrixGrainDensity_UCF_[kg/m3]	UZFT	823	
MatrixGrainDensity_UFZ_[kg/m3]	UZFT	825	
MatrixKD_BFw_C[m3/kg]	UZFT	698	
MatrixKD_BFw_Cl[m3/kg]	UZFT	656	
MatrixKD_BFw_Cm[m3/kg]	UZFT	663	
MatrixKD_BFw_Cs[m3/kg]	UZFT	684	
MatrixKD_BFw_I[m3/kg]	UZFT	642	
MatrixKD_BFw_Nb[m3/kg]	UZFT	712	
MatrixKD_BFw_Ni[m3/kg]	UZFT	691	
MatrixKD_BFw_Pb[m3/kg]	UZFT	677	
MatrixKD_BFw_Ra[m3/kg]	UZFT	670	
MatrixKD_BFw_Se[m3/kg]	UZFT	705	
MatrixKD_BFw_Tc[m3/kg]	UZFT	649	
MatrixKD_CHnvC[m3/kg]	UZFT	694	
MatrixKD_CHnvCl[m3/kg]	UZFT	652	
MatrixKD_CHnvCm[m3/kg]	UZFT	659	
MatrixKD_CHnvCs[m3/kg]	UZFT	680	
MatrixKD_CHnvI[m3/kg]	UZFT	638	
MatrixKD_CHnvNb[m3/kg]	UZFT	708	
MatrixKD_CHnvNi[m3/kg]	UZFT	687	
MatrixKD_CHnvPb[m3/kg]	UZFT	673	
MatrixKD_CHnvRa[m3/kg]	UZFT	666	
MatrixKD_CHnvSe[m3/kg]	UZFT	701	
MatrixKD_CHnvTc[m3/kg]	UZFT	645	
MatrixKD_CHnzC[m3/kg]	UZFT	695	
MatrixKD_CHnzCl[m3/kg]	UZFT	653	
MatrixKD_CHnzCm[m3/kg]	UZFT	660	
MatrixKD_CHnzCs[m3/kg]	UZFT	681	
MatrixKD_CHnzI[m3/kg]	UZFT	639	
MatrixKD_CHnzNb[m3/kg]	UZFT	709	
MatrixKD_CHnzNi[m3/kg]	UZFT	688	
MatrixKD_CHnzPb[m3/kg]	UZFT	674	
MatrixKD_CHnzRa[m3/kg]	UZFT	667	
MatrixKD_CHnzSe[m3/kg]	UZFT	702	
MatrixKD_CHnzTc[m3/kg]	UZFT	646	
MatrixKD_PPw_C[m3/kg]	UZFT	696	
MatrixKD_PPw_Cl[m3/kg]	UZFT	654	
MatrixKD_PPw_Cm[m3/kg]	UZFT	661	
MatrixKD_PPw_Cs[m3/kg]	UZFT	682	
MatrixKD_PPw_I[m3/kg]	UZFT	640	
MatrixKD_PPw_Nb[m3/kg]	UZFT	710	
MatrixKD_PPw_Ni[m3/kg]	UZFT	689	
MatrixKD_PPw_Pb[m3/kg]	UZFT	675	
MatrixKD_PPw_Ra[m3/kg]	UZFT	668	

MatrixKD_PPw_Se[m3/kg]	UZFT	703	
MatrixKD_PPw_Tc[m3/kg]	UZFT	647	
MatrixKD_TSw_C[m3/kg]	UZFT	693	
MatrixKD_TSw_Cl[m3/kg]	UZFT	651	
MatrixKD_TSw_Cm[m3/kg]	UZFT	658	
MatrixKD_TSw_Cs[m3/kg]	UZFT	679	
MatrixKD_TSw_I[m3/kg]	UZFT	637	
MatrixKD_TSw_Nb[m3/kg]	UZFT	707	
MatrixKD_TSw_Ni[m3/kg]	UZFT	686	
MatrixKD_TSw_Pb[m3/kg]	UZFT	672	
MatrixKD_TSw_Ra[m3/kg]	UZFT	665	
MatrixKD_TSw_Se[m3/kg]	UZFT	700	
MatrixKD_TSw_Tc[m3/kg]	UZFT	644	
MatrixKD_UCF_C[m3/kg]	UZFT	697	
MatrixKD_UCF_Cl[m3/kg]	UZFT	655	
MatrixKD_UCF_Cm[m3/kg]	UZFT	662	
MatrixKD_UCF_Cs[m3/kg]	UZFT	683	
MatrixKD_UCF_I[m3/kg]	UZFT	641	
MatrixKD_UCF_Nb[m3/kg]	UZFT	711	
MatrixKD_UCF_Ni[m3/kg]	UZFT	690	
MatrixKD_UCF_Pb[m3/kg]	UZFT	676	
MatrixKD_UCF_Ra[m3/kg]	UZFT	669	
MatrixKD_UCF_Se[m3/kg]	UZFT	704	
MatrixKD_UCF_Tc[m3/kg]	UZFT	648	
MatrixKD_UFZ_C[m3/kg]	UZFT	699	
MatrixKD_UFZ_Cl[m3/kg]	UZFT	657	
MatrixKD_UFZ_Cm[m3/kg]	UZFT	664	
MatrixKD_UFZ_Cs[m3/kg]	UZFT	685	
MatrixKD_UFZ_I[m3/kg]	UZFT	643	
MatrixKD_UFZ_Nb[m3/kg]	UZFT	713	
MatrixKD_UFZ_Ni[m3/kg]	UZFT	692	
MatrixKD_UFZ_Pb[m3/kg]	UZFT	678	
MatrixKD_UFZ_Ra[m3/kg]	UZFT	671	
MatrixKD_UFZ_Se[m3/kg]	UZFT	706	
MatrixKD_UFZ_Tc[m3/kg]	UZFT	650	
MatrixLongitudinalDispersivity[FractionOfLayer]	UZFT	632	
MatrixPermeability_BFw_[m2]	UZFT	803	
MatrixPermeability_CHnv[m2]	UZFT	799	
MatrixPermeability_CHnz[m2]	UZFT	800	
MatrixPermeability_PPw_[m2]	UZFT	801	
MatrixPermeability_TSw_[m2]	UZFT	798	
MatrixPermeability_UCF_[m2]	UZFT	802	
MatrixPermeability_UFZ_[m2]	UZFT	804	
MatrixPoreRadius_BFw_[m]	UZFT	831	
MatrixPoreRadius_CHnv[m]	UZFT	827	
MatrixPoreRadius_CHnz[m]	UZFT	828	
MatrixPoreRadius_PPw_[m]	UZFT	829	
MatrixPoreRadius_TSw_[m]	UZFT	826	
MatrixPoreRadius_UCF_[m]	UZFT	830	
MatrixPoreRadius_UFZ_[m]	UZFT	832	
MatrixPorosity_BFw_	UZFT	810	
MatrixPorosity_CHnv	UZFT	806	
MatrixPorosity_CHnz	UZFT	807	
MatrixPorosity_PPw_	UZFT	808	
MatrixPorosity_TSw_	UZFT	805	
MatrixPorosity_UCF_	UZFT	809	
MatrixPorosity_UFZ_	UZFT	811	
MaximumAshDensityforVariationWithSize[g/cm3]	ASHPLUMO	1236	

MaximumAshLogdiameterForDensityVariation	ASHPLUMO	1238	
MaximumFluoride[mol/L]	DSFAIL	185	
MaximumFluxInRefluxZone[m/s]	NFENV	137	
MaximumFuelParticulateSize[cm]	ASHPLUMO	1234	
MaximumParticleDiameterForParticleTransport[cm]	ASHPLUMO	1231	
MaximumTime[yr]	Simulation Times	54	
MeanAnnualPrecipitationMultiplierAtGlacialMaximum	UZFLOW	73	
MeanAnnualTemperatureIncreaseAtGlacialMaximum[degC]	UZFLOW	74	
MeasuredGalvanicCouplePotential	EBSFAIL	251	
MetalGrainRadius[micrometer]	EBSFAIL	228	
MilkConsumptionRate1[kg/yr]	GENTPA	1108	
MilkConsumptionRate2[kg/yr]	GENTPA	1120	
MilkConsumptionRate3[kg/yr]	GENTPA	1132	
MilkConsumptionRate4[kg/yr]	GENTPA	1144	
MilkConsumptionRate5[kg/yr]	GENTPA	1156	
MilkConsumptionRate6[kg/yr]	GENTPA	1168	
MilkFreshForageDietFraction	GENTPA	1090	
MilkFreshForageGrowTime[day]	GENTPA	1092	
MilkFreshForageIrrigationRateCB[in/yr]	GENTPA	1098	
MilkFreshForageIrrigationRatePB[in/yr]	GENTPA	1094	
MilkFreshForageIrrigationTimeCB[mo/yr]	GENTPA	1100	
MilkFreshForageIrrigationTimePB[mo/yr]	GENTPA	1096	
MinimumAshDensityforVariationWithSize[g/cm3]	ASHPLUMO	1235	
MinimumAshLogdiameterForDensityVariation	ASHPLUMO	1237	
MinimumFluoride[mol/L]	DSFAIL	184	
MinimumFuelParticulateSize[cm]	ASHPLUMO	1232	
MinimumResidenceTime_SAV[yr]	SZFT	984	
MinimumResidenceTime_STFF[yr]	SZFT	983	
MixingZoneDispersionFraction	SZFT	980	
MixingZoneThickness[m]	DCAGW	1046	
ModeFuelParticulateSize[cm]	ASHPLUMO	1233	
NEAmountOfLargestCredibleDisplacement[m]	FAULTO	1210	
NECumulativeDisplacementRate[mm/yr]	FAULTO	1212	
NEFaultStrikeOrientationMeasuredfromNorthClockwise[degrees]	FAULTO	1204	
NEFaultTraceLength[m]	FAULTO	1206	
NEFaultZoneWidth[m]	FAULTO	1208	
NegativeLog10CarbonateConcentration[mol/L]	EBSREL	449	
NsetLatinHypercubeSampling	Sampling	48	
nsetUsedToPickTempRHDataSet	NFENV	122	
NumberOfBlockSizePoints[]	SEISMO	284	
NumberOfMagmaInducedMechanicalFailuresRemainingInDrift[ ]	VOLCANO	1226	
NumberOfRealizations	Sampling	49	
NumberOfSEISMOWPFailureIntervalues	EBSREL	439	
NumberOfTimeStepsAfterCompliancePeriod	Simulation Times	57	
NumberOfTimeStepsInCompliancePeriod	Simulation Times	55	
NumberOfWeightsForGaussLegendreIntegration[]	NFENV	172	
NumberOfWPsEntrainedByEjecta[ ]	VOLCANO	1225	
NWAmountOfLargestCredibleDisplacement[m]	FAULTO	1209	
NWCumulativeDisplacementRate[mm/yr]	FAULTO	1211	
NWFaultStrikeOrientationMeasuredfromNorthClockwise[degrees]	FAULTO	1203	
NWFaultTraceLength[m]	FAULTO	1205	
NWFaultZoneWidth[m]	FAULTO	1207	
OccupancyFractionInsideHeavyDisturbance[]	DCAGS	1323	
OccupancyFractionInsideLightDisturbance[]	DCAGS	1324	
OccupancyFractionOffsite[]	DCAGS	1325	
OccupancyFractionOutsideHeavyDisturbance[]	DCAGS	1321	
OccupancyFractionOutsideLightDisturbance[]	DCAGS	1322	
OneTemperatureCellPerWP(yes=1,no=0)	NFENV	123	

OtherVegetableConsumptionRate1[kg/yr]	GENTPA	1103	
OtherVegetableConsumptionRate2[kg/yr]	GENTPA	1115	
OtherVegetableConsumptionRate3[kg/yr]	GENTPA	1127	
OtherVegetableConsumptionRate4[kg/yr]	GENTPA	1139	
OtherVegetableConsumptionRate5[kg/yr]	GENTPA	1151	
OtherVegetableConsumptionRate6[kg/yr]	GENTPA	1163	
OtherVegetableIrrigationRateCB[in/yr]	GENTPA	1074	
OtherVegetableIrrigationRatePB[in/yr]	GENTPA	1060	
OtherVegetableIrrigationTimeCB[mo/yr]	GENTPA	1081	
OtherVegetableIrrigationTimePB[mo/yr]	GENTPA	1067	
OuterActivationEnergyPassiveCurrDens[J/mol]	EBSFAIL	206	
OuterActivationEnergyReductionReactHighpH[J/mole]	EBSFAIL	194	
OuterActivationEnergyReductionReactLowpH[J/mole]	EBSFAIL	195	
OuterChargeTransferCoefReductionReactHighpH	EBSFAIL	190	
OuterChargeTransferCoefReductionReactLowpH	EBSFAIL	191	
OuterDeltaEcritInh[mV]	EBSFAIL	212	
OuterEffectiveReactionOrderHHighpH	EBSFAIL	196	
OuterEffectiveReactionOrderHLowpH	EBSFAIL	197	
OuterInhibitingCarbonateToCl	EBSFAIL	210	
OuterInhibitingNitrateToCl	EBSFAIL	209	
OuterInhibitingSulfateToCl	EBSFAIL	211	
OuterOverpackErpIntercept	EBSFAIL	235	
OuterOverpackErpSlope	EBSFAIL	237	
OuterReferenceCurrReductionReactHighpH[C/(m2*yr)]	EBSFAIL	192	
OuterReferenceCurrReductionReactLowpH[C/(m2*yr)]	EBSFAIL	193	
OuterWPActivationEnergyforWaterReduction[J/mole]	EBSFAIL	246	
OuterWPBetaKineticsParameterforWater	EBSFAIL	243	
OuterWPRateConstantforWaterReduction[coulomb-m/m^2/yr]	EBSFAIL	245	
OuterWPThickness[m]	EBSFAIL	226	
OutputMode(0=None,1=All,2=UserDefined)	Output	60	
OxygenPartialPressure[atm]	EBSREL	448	
ParticleShapeParameter	ASHPLUMO	1239	
PerchedBucketVolumePerSAarea[m3/m2]	NFENV	138	
PermanentLossColloidFilterFactor_BFw_[]	UZFT	719	
PermanentLossColloidFilterFactor_CHnv[]	UZFT	715	
PermanentLossColloidFilterFactor_CHnz[]	UZFT	716	
PermanentLossColloidFilterFactor_Invert_Ja[]	EBSFILT	620	
PermanentLossColloidFilterFactor_Invert_Jc[]	EBSFILT	621	
PermanentLossColloidFilterFactor_Invert_Jp[]	EBSFILT	622	
PermanentLossColloidFilterFactor_Invert_Jt[]	EBSFILT	623	
PermanentLossColloidFilterFactor_PPw_[]	UZFT	717	
PermanentLossColloidFilterFactor_TSw_[]	UZFT	714	
PermanentLossColloidFilterFactor_UCF_[]	UZFT	718	
PermanentLossColloidFilterFactor_UFZ_[]	UZFT	720	
pH_AllUZ_SZLayers[StandardUnits]	UZFT	636	
pHForGlassModel[]	Glass	581	
pHParameterHighRange[]	Glass	583	
pHParameterLowRange[]	Glass	586	
PlantUptakeScaleFactor	GENTPA	1173	
PlumeCaptureModel(1=UserDefined,2=Calculated)	DCAGW	1042	
PlumeThickness[m]	DCAGW	1044	
PluvialDilutionModel(1=UserDefined,2=PumpingRate)	DCAGW	1051	
PluvialSwitchTime[yr]	DCAGW	1050	
PluvialWellPumpingRateAtReceptorGroup[gal/day]	DCAGW	1053	
PorosityOfScaleonWP	EBSFAIL	266	
PostEruptionYieldVolumeFluvialAsh[m/event]	ASHREMOB	1334	
PoultryConsumptionRate1[kg/yr]	GENTPA	1107	
PoultryConsumptionRate2[kg/yr]	GENTPA	1119	

PoultryConsumptionRate3[kg/yr]	GENTPA	1131	
PoultryConsumptionRate4[kg/yr]	GENTPA	1143	
PoultryConsumptionRate5[kg/yr]	GENTPA	1155	
PoultryConsumptionRate6[kg/yr]	GENTPA	1167	
PoultryFeedGrowTime[day]	GENTPA	1087	
PoultryFeedIrrigationRateCB[in/yr]	GENTPA	1078	
PoultryFeedIrrigationRatePB[in/yr]	GENTPA	1064	
PoultryFeedIrrigationTimeCB[mo/yr]	GENTPA	1085	
PoultryFeedIrrigationTimePB[mo/yr]	GENTPA	1071	
PPw_Thickness_10SubArea[m]	UZFT	972	
PPw_Thickness_1SubArea[m]	UZFT	909	
PPw_Thickness_2SubArea[m]	UZFT	916	
PPw_Thickness_3SubArea[m]	UZFT	923	
PPw_Thickness_4SubArea[m]	UZFT	930	
PPw_Thickness_5SubArea[m]	UZFT	937	
PPw_Thickness_6SubArea[m]	UZFT	944	
PPw_Thickness_7SubArea[m]	UZFT	951	
PPw_Thickness_8SubArea[m]	UZFT	958	
PPw_Thickness_9SubArea[m]	UZFT	965	
Preexponential_SFDissolutionModel2	EBSREL	451	
PresentDayDilutionModel(0,1,2,3,4)	DCAGW	1047	
ProbabilityForNWOrientationOfFaults	FAULTO	1201	
RadiusOfSFGrain[m]	EBSREL	489	
RateOfReductionOfMassLoadingFactor[1/yr]	DCAGS	1312	
RatioOfLastToFirstTimeStepAfterCompliancePeriod	Simulation Times	58	
RatioOfLastToFirstTimeStepInCompliancePeriod	Simulation Times	56	
RD_Invert_Am	EBSREL	455	
RD_Invert_C	EBSREL	465	
RD_Invert_Cl	EBSREL	464	
RD_Invert_Cm	EBSREL	452	
RD_Invert_Cs	EBSREL	460	
RD_Invert_I	EBSREL	461	
RD_Invert_Nb	EBSREL	467	
RD_Invert_Ni	EBSREL	463	
RD_Invert_Np	EBSREL	456	
RD_Invert_Pb	EBSREL	459	
RD_Invert_Pu	EBSREL	453	
RD_Invert_Ra	EBSREL	458	
RD_Invert_Se	EBSREL	466	
RD_Invert_Tc	EBSREL	462	
RD_Invert_Th	EBSREL	457	
RD_Invert_U	EBSREL	454	
ReceptorAgeGroup(1=Nfnt,2=Tod,3=PTeen,4=Teen,5=Adlt,6=AdltFGR11)	GENTPA	1055	
ReceptorGroup(1=Farming,2=Residential)	DCAGW	1040	
ReceptorGroupArea[m2]	ASHRMOVO	1307	
ReferencepH	EBSFAIL	263	
Reflux2LossD	NFENV	145	
Reflux2LossI	NFENV	144	
Reflux2Period	NFENV	143	
Reflux2Porosity	NFENV	140	
Reflux2SatInit	NFENV	141	
Reflux2SatResid	NFENV	142	
Reflux2Thickness	NFENV	139	
RefTemperaturePassiveCurrDens[K]	EBSFAIL	208	
RelativeHumidityForVentilatedAir[]	NFENV	117	
RelativeHumidityTransitionTimeAfterClosure[yr]	NFENV	116	
RelativeRateOfBlanketRemoval[l/yr]	ASHRMOVO	1249	

RewettingHumidity	NFENV	120	
RNtoDetermineFaultOrientation	FAULTO	1202	
RNtoDetermineIfExtrusiveOrIntrusiveVolcanicEvent	VOLCANO	1218	
RockMassDensityForRockTypeOne[kg/m^3]	SEISMO	302	
RockMassDensityForRockTypeTwo[kg/m^3]	SEISMO	303	
SafetyFactor	EBSFAIL	268	
SaturatedZoneMinimumVelocityChangeFactor[Fraction]	SZFT	1037	
SeedForRandomNumber	Sampling	46	
SeedForRandomNumberForSEISMO	SEISMO	281	
SeepageThresholdT[C]	NFENV	118	
SeismicDisruptiveScenarioFlag(yes=1,no=0)	Disruptive Scenarios	36	
SeismicHazardCurveforSEISMO	SEISMO	282	
SelectAppendFiles	Output	64	
SelectParticleModel(1,2)	NFENV	84	
SelectRefluxModel(1,2,3)	NFENV	135	
SelectThermalModel(1,2)	NFENV	82	
SelfDiffusionCoefficientOfWaterAt20C[m^2/s]	Diffusion	594	
SFC-14InventoryPerKgSF[ci]	EBSREL	493	
SFDensity[kg/m3]	EBSREL	446	
SFWettedFraction_Corrosion_1	EBSREL	565	
SFWettedFraction_Corrosion_10	EBSREL	574	
SFWettedFraction_Corrosion_2	EBSREL	566	
SFWettedFraction_Corrosion_3	EBSREL	567	
SFWettedFraction_Corrosion_4	EBSREL	568	
SFWettedFraction_Corrosion_5	EBSREL	569	
SFWettedFraction_Corrosion_6	EBSREL	570	
SFWettedFraction_Corrosion_7	EBSREL	571	
SFWettedFraction_Corrosion_8	EBSREL	572	
SFWettedFraction_Corrosion_9	EBSREL	573	
SFWettedFraction_FAULTO	EBSREL	523	
SFWettedFraction_Initial_1	EBSREL	513	
SFWettedFraction_Initial_10	EBSREL	522	
SFWettedFraction_Initial_2	EBSREL	514	
SFWettedFraction_Initial_3	EBSREL	515	
SFWettedFraction_Initial_4	EBSREL	516	
SFWettedFraction_Initial_5	EBSREL	517	
SFWettedFraction_Initial_6	EBSREL	518	
SFWettedFraction_Initial_7	EBSREL	519	
SFWettedFraction_Initial_8	EBSREL	520	
SFWettedFraction_Initial_9	EBSREL	521	
SFWettedFraction_SEISMO1_1	EBSREL	525	
SFWettedFraction_SEISMO1_10	EBSREL	534	
SFWettedFraction_SEISMO1_2	EBSREL	526	
SFWettedFraction_SEISMO1_3	EBSREL	527	
SFWettedFraction_SEISMO1_4	EBSREL	528	
SFWettedFraction_SEISMO1_5	EBSREL	529	
SFWettedFraction_SEISMO1_6	EBSREL	530	
SFWettedFraction_SEISMO1_7	EBSREL	531	
SFWettedFraction_SEISMO1_8	EBSREL	532	
SFWettedFraction_SEISMO1_9	EBSREL	533	
SFWettedFraction_SEISMO2_1	EBSREL	535	
SFWettedFraction_SEISMO2_10	EBSREL	544	
SFWettedFraction_SEISMO2_2	EBSREL	536	
SFWettedFraction_SEISMO2_3	EBSREL	537	
SFWettedFraction_SEISMO2_4	EBSREL	538	
SFWettedFraction_SEISMO2_5	EBSREL	539	
SFWettedFraction_SEISMO2_6	EBSREL	540	
SFWettedFraction_SEISMO2_7	EBSREL	541	

SFWettedFraction_SEISMO2_8	EBSREL	542	
SFWettedFraction_SEISMO2_9	EBSREL	543	
SFWettedFraction_SEISMO3_1	EBSREL	545	
SFWettedFraction_SEISMO3_10	EBSREL	554	
SFWettedFraction_SEISMO3_2	EBSREL	546	
SFWettedFraction_SEISMO3_3	EBSREL	547	
SFWettedFraction_SEISMO3_4	EBSREL	548	
SFWettedFraction_SEISMO3_5	EBSREL	549	
SFWettedFraction_SEISMO3_6	EBSREL	550	
SFWettedFraction_SEISMO3_7	EBSREL	551	
SFWettedFraction_SEISMO3_8	EBSREL	552	
SFWettedFraction_SEISMO3_9	EBSREL	553	
SFWettedFraction_SEISMO4_1	EBSREL	555	
SFWettedFraction_SEISMO4_10	EBSREL	564	
SFWettedFraction_SEISMO4_2	EBSREL	556	
SFWettedFraction_SEISMO4_3	EBSREL	557	
SFWettedFraction_SEISMO4_4	EBSREL	558	
SFWettedFraction_SEISMO4_5	EBSREL	559	
SFWettedFraction_SEISMO4_6	EBSREL	560	
SFWettedFraction_SEISMO4_7	EBSREL	561	
SFWettedFraction_SEISMO4_8	EBSREL	562	
SFWettedFraction_SEISMO4_9	EBSREL	563	
SFWettedFraction_VOLCANO	EBSREL	524	
SkewnessOfDistribution[]	NFENV	93	
SlopeOfCrackAreaCurve[m^2/yr]	Diffusion	591	
SoilBulkDensity[g/cm3]	GENTPA	1193	
SoilContaminationExposureTime1[hr]	GENTPA	1112	
SoilContaminationExposureTime2[hr]	GENTPA	1124	
SoilContaminationExposureTime3[hr]	GENTPA	1136	
SoilContaminationExposureTime4[hr]	GENTPA	1148	
SoilContaminationExposureTime5[hr]	GENTPA	1160	
SoilContaminationExposureTime6[hr]	GENTPA	1172	
SoilVolumetricWaterContent	GENTPA	1194	
SolubilityAm[kg/m3]	EBSREL	497	
SolubilityC[kg/m3]	EBSREL	502	
SolubilityCl[kg/m3]	EBSREL	501	
SolubilityCm[kg/m3]	EBSREL	504	
SolubilityCs[kg/m3]	EBSREL	509	
SolubilityI[kg/m3]	EBSREL	499	
SolubilityNb[kg/m3]	EBSREL	512	
SolubilityNi[kg/m3]	EBSREL	510	
SolubilityNp[kg/m3]	EBSREL	498	
SolubilityOfActiniumInVolcanicAsh[moles/liter]	ASHRMOVO	1290	
SolubilityOfAmericiumInVolcanicAsh[moles/liter]	ASHRMOVO	1285	
SolubilityOfCarbonInVolcanicAsh[moles/liter]	ASHRMOVO	1306	
SolubilityOfCesiumInVolcanicAsh[moles/liter]	ASHRMOVO	1293	
SolubilityOfChlorineInVolcanicAsh[moles/liter]	ASHRMOVO	1305	
SolubilityOfCuriumInVolcanicAsh[moles/liter]	ASHRMOVO	1283	
SolubilityOfIodineInVolcanicAsh[moles/liter]	ASHRMOVO	1294	
SolubilityOfLeadInVolcanicAsh[moles/liter]	ASHRMOVO	1288	
SolubilityOfMolybdenumInVolcanicAsh[moles/liter]	ASHRMOVO	1299	
SolubilityOfNeptuniumInVolcanicAsh[moles/liter]	ASHRMOVO	1291	
SolubilityOfNickelInVolcanicAsh[moles/liter]	ASHRMOVO	1304	
SolubilityOfNiobiumInVolcanicAsh[moles/liter]	ASHRMOVO	1300	
SolubilityOfPaladiumInVolcanicAsh[moles/liter]	ASHRMOVO	1297	
SolubilityOfPlutoniumInVolcanicAsh[moles/liter]	ASHRMOVO	1284	
SolubilityOfProtactiniumInVolcanicAsh[moles/liter]	ASHRMOVO	1289	
SolubilityOfRadiumInVolcanicAsh[moles/liter]	ASHRMOVO	1287	

SolubilityOfSamariumInVolcanicAsh[moles/liter]	ASHRMOVO	1292	
SolubilityOfSeleniumInVolcanicAsh[moles/liter]	ASHRMOVO	1303	
SolubilityOfSilverInVolcanicAsh[moles/liter]	ASHRMOVO	1296	
SolubilityOfStrontiumInVolcanicAsh[moles/liter]	ASHRMOVO	1302	
SolubilityOfTechnetiumInVolcanicAsh[moles/liter]	ASHRMOVO	1298	
SolubilityOfThoriumInVolcanicAsh[moles/liter]	ASHRMOVO	1286	
SolubilityOfTinInVolcanicAsh[moles/liter]	ASHRMOVO	1295	
SolubilityOfUraniumInVolcanicAsh[moles/liter]	ASHRMOVO	1282	
SolubilityOfZirconiumInVolcanicAsh[moles/liter]	ASHRMOVO	1301	
SolubilityPb[kg/m3]	EBSREL	508	
SolubilityPu[kg/m3]	EBSREL	505	
SolubilityRa[kg/m3]	EBSREL	507	
SolubilitySe[kg/m3]	EBSREL	511	
SolubilityTc[kg/m3]	EBSREL	500	
SolubilityTh[kg/m3]	EBSREL	506	
SolubilityU[kg/m3]	EBSREL	503	
SortingCoefficient[]	NFENV	92	
SpecificHeatofYMRock[J/(kg-K)]	NFENV	162	
StandardDeviationOfMAPAboutMeanInOneTimePeriod[mm/yr]	UZFLOW	77	
StandardDeviationOfMATAboutMeanInOneTimePeriod[degC]	UZFLOW	78	
StartAtRealization	Sampling	50	
StartAtSubarea	Subareas	39	
StartingBlockPointerOne_1[]	SEISMO	304	
StartingBlockPointerOne_10[]	SEISMO	313	
StartingBlockPointerOne_2[]	SEISMO	305	
StartingBlockPointerOne_3[]	SEISMO	306	
StartingBlockPointerOne_4[]	SEISMO	307	
StartingBlockPointerOne_5[]	SEISMO	308	
StartingBlockPointerOne_6[]	SEISMO	309	
StartingBlockPointerOne_7[]	SEISMO	310	
StartingBlockPointerOne_8[]	SEISMO	311	
StartingBlockPointerOne_9[]	SEISMO	312	
StartingBlockPointerTwo_1[ ]	SEISMO	314	
StartingBlockPointerTwo_10[ ]	SEISMO	323	
StartingBlockPointerTwo_2[ ]	SEISMO	315	
StartingBlockPointerTwo_3[ ]	SEISMO	316	
StartingBlockPointerTwo_4[ ]	SEISMO	317	
StartingBlockPointerTwo_5[ ]	SEISMO	318	
StartingBlockPointerTwo_6[ ]	SEISMO	319	
StartingBlockPointerTwo_7[ ]	SEISMO	320	
StartingBlockPointerTwo_8[ ]	SEISMO	321	
StartingBlockPointerTwo_9[ ]	SEISMO	322	
StopAtRealization	Sampling	51	
StopAtSubarea	Subareas	40	
StreamTubeWidthMultiplier[]	SZFT	1036	
SubareaOfVolcanicEvent[ ]	VOLCANO	1224	
SubAreaWetFraction	EBSREL	436	
SubGrainFragmentRadiusAfterTransFrac[m]	EBSREL	491	
SubsystemEngineeringStudy	Importance Analysis	21	
SubsystemNatural Study	Importance Analysis	5	
SurfaceAreaFactor_BFw_[]	UZFT	866	
SurfaceAreaFactor_CHnv[]	UZFT	862	
SurfaceAreaFactor_CHnz[]	UZFT	863	
SurfaceAreaFactor_PPw_[]	UZFT	864	
SurfaceAreaFactor_SAV_[]	SZFT	1007	
SurfaceAreaFactor_STFF[]	SZFT	1008	
SurfaceAreaFactor_TSw_[]	UZFT	861	
SurfaceAreaFactor_UCF_[]	UZFT	865	

SurfaceAreaFactor_UFZ_[]	UZFT	867	
SurfaceAreaOfGlass[m^2/kg]	Glass	580	
SZFluxMultiplierAtGlacialMaximum[]	SZFT	1038	
SZFractureForceFactorForKdToRd	SZFT	977	
TabularTemperatureRHFlag(yes=1,no=0)	NFENV	121	
TempCoefOfInnerPackErpIntercept	EBSFAIL	240	
TempCoefOfInnerPackErpSlope	EBSFAIL	242	
TempCoefOfOuterPackErpIntercept	EBSFAIL	236	
TempCoefOfOuterPackErpSlope	EBSFAIL	238	
TemperatureCoefficientOfErpInterceptWeld[mVSHE/C]	EBSFAIL	223	
TemperatureCoefficientOfErpSlopeWeld[mVSHE/C]	EBSFAIL	225	
TemperatureGradientInVicinityOfBoilingIsotherm[K/m]	NFENV	155	
TemperatureReferencePoint(1=SubareaCentroid,2=UserDefined)[]	NFENV	124	
ThermalConductivityOfAir[W/(m-C)]	NFENV	90	
ThermalConductivityOfBackfill[W/(m-C)]	NFENV	174	
ThermalConductivityOfDripShield[W/(m-C)]	NFENV	173	
ThermalConductivityOfFloor[W/(m-C)]	NFENV	168	
ThermalConductivityOfInnerOverpack[W/m-C]	NFENV	175	
ThermalConductivityOfOuterOverpack[W/m-C]	NFENV	176	
ThermalConductivityofYMRock[W/(m-K)]	NFENV	163	
ThermalDiffusivity[m^2/s]	NFENV	86	
ThicknessOfCladding[m]	EBSREL	492	
ThicknessOfWaterFilm[m]	EBSFAIL	233	
ThicknessRockfallRubbleAboveDripShieldCrown[m]	SEISMO	283	
ThresholdDisplacementforFaultDisruptionOfWp[m]	FAULTO	1198	
TiCorrosionRateVsFluorideSlope[]	DSFAIL	183	
TimeBetweenFlowEvents[yr]	ASHREMOB	1333	
TimeOfBackfillEmplaced[yr]	NFENV	171	
TimeOfNextFaultingEventInRegionOfInterest[yr]	FAULTO	1197	
TimeOfNextVolcanicEventinRegionOfInterest[yr]	VOLCANO	1215	
TimeStepForClimate[yr]	UZFLOW	76	
TortuosityOfBackfill[]	NFENV	91	
TortuosityOfScaleonWP	EBSFAIL	265	
TotalAnnualEvapotranspiration[m]yr]	GENTPA	1195	
TotalAreaOfCracksPerWPAtEmplacement[m^2]	Diffusion	590	
TotalWasteEmplacedInRepository[MTU]	NFENV	148	
TransitionLowHighpH	EBSFAIL	189	
TSw_Thickness_10SubArea[m]	UZFT	969	
TSw_Thickness_1SubArea[m]	UZFT	906	
TSw_Thickness_2SubArea[m]	UZFT	913	
TSw_Thickness_3SubArea[m]	UZFT	920	
TSw_Thickness_4SubArea[m]	UZFT	927	
TSw_Thickness_5SubArea[m]	UZFT	934	
TSw_Thickness_6SubArea[m]	UZFT	941	
TSw_Thickness_7SubArea[m]	UZFT	948	
TSw_Thickness_8SubArea[m]	UZFT	955	
TSw_Thickness_9SubArea[m]	UZFT	962	
UCF_Thickness_10SubArea[m]	UZFT	973	
UCF_Thickness_1SubArea[m]	UZFT	910	
UCF_Thickness_2SubArea[m]	UZFT	917	
UCF_Thickness_3SubArea[m]	UZFT	924	
UCF_Thickness_4SubArea[m]	UZFT	931	
UCF_Thickness_5SubArea[m]	UZFT	938	
UCF_Thickness_6SubArea[m]	UZFT	945	
UCF_Thickness_7SubArea[m]	UZFT	952	
UCF_Thickness_8SubArea[m]	UZFT	959	
UCF_Thickness_9SubArea[m]	UZFT	966	
UFZ_Thickness_10SubArea[m]	UZFT	975	

UFZ_Thickness_1SubArea[m]	UZFT	912	
UFZ_Thickness_2SubArea[m]	UZFT	919	
UFZ_Thickness_3SubArea[m]	UZFT	926	
UFZ_Thickness_4SubArea[m]	UZFT	933	
UFZ_Thickness_5SubArea[m]	UZFT	940	
UFZ_Thickness_6SubArea[m]	UZFT	947	
UFZ_Thickness_7SubArea[m]	UZFT	954	
UFZ_Thickness_8SubArea[m]	UZFT	961	
UFZ_Thickness_9SubArea[m]	UZFT	968	
UnsaturatedZoneMinimumVelocityChangeFactor[Fraction]	UZFT	631	
UseFluorideEnhancingFactor(0=no,1=yes)	DSFAIL	182	
UserDefinedLowerRealizationAppended	Output	61	
UserDefinedPlumeCaptureFraction	DCAGW	1043	
UserDefinedPluvialDilutionVolume[gal/day]	DCAGW	1052	
UserDefinedPresentDayDilutionVolume[gal/day]	DCAGW	1048	
UserDefinedUpperRealizationAppended	Output	62	
UserLeachRate[kg/yr/m2]	EBSREL	450	
UserTemperatureReferencePoint_x[UTM]	NFENV	125	
UserTemperatureReferencePoint_y[UTM]	NFENV	126	
UserTemperatureReferencePoint_z[m]	NFENV	127	
UZFLOWHydraulicPropertyUncertaintyDeviation[N(0,1)]	UZFLOW	72	
UZFLOWSampleMode	UZFLOW	70	
UZFractureForceFactorForKdtoRd	UZFT	634	
ViscosityOfAirAtSTP[g/cm-s]	ASHPLUMO	1229	
VolcanicColumnConstantBeta	ASHPLUMO	1245	
VolcanicEventDuration[s]	ASHPLUMO	1243	
VolcanicEventPower[W]	ASHPLUMO	1244	
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	Disruptive Scenarios	34	
VolcanoModel(1=Geometric,2-Distribution)	VOLCANO	1214	
VolumeOfThermalExpansion[1/K]	NFENV	87	
WasteFormDissolutionEnhancementFactor[]	EBSREL	425	
WastePackageFlowMultiplicationFactor	EBSREL	435	
WastePackageOuterBarrierFailureLogStrain[]	SEISMO	301	
WastePackageOuterBarrierUltimateTensileStrength[Mpa]	SEISMO	280	
WastePackageOuterBarrierYieldStress[MPa]	SEISMO	300	
WastePackagePayload[MTU]	NFENV	156	
WaterContactMode_Corrosion(0=BathTub,1=FlowThrough)	EBSREL	434	
WaterContactMode_Faulting(0=BathTub,1=FlowThrough)	EBSREL	428	
WaterContactMode_Initial(0=BathTub,1=FlowThrough)	EBSREL	427	
WaterContactMode_SeismicInterval1(0=BathTub,1=FlowThrough)	EBSREL	430	
WaterContactMode_SeismicInterval2(0=BathTub,1=FlowThrough)	EBSREL	431	
WaterContactMode_SeismicInterval3(0=BathTub,1=FlowThrough)	EBSREL	432	
WaterContactMode_SeismicInterval4(0=BathTub,1=FlowThrough)	EBSREL	433	
WaterContactMode_Volcanic(0=BathTub,1=FlowThrough)	EBSREL	429	
WeightingFactorEolian[]	ASHREMOB	1335	
WeightingFactorFluvial[]	ASHREMOB	1330	
WeightingFactorInitialDeposit[]	ASHREMOB	1329	
WeldAdvectiveFraction[]	EBSREL	426	
WeldCrackLength[m]	Diffusion	589	
WeldCritChlorideConc[mol/L]	EBSFAIL	217	
WeldDeltaEcritInh[mV]	EBSFAIL	221	
WeldInhibitingCarbonateToCl	EBSFAIL	219	
WeldInhibitingNitrateToCl	EBSFAIL	218	
WeldInhibitingSulfateToCl	EBSFAIL	220	
WellPumpingRateAtReceptorGroup[gal/day]	DCAGW	1049	
WellPumpingRateGroundwaterProtection[gal/day]	Groundwater Protection	67	
WidthOfVolcanicDike[m]	VOLCANO	1222	
WindDirection[degrees]	ASHPLUMO	1241	

WindSpeed[cm/s]	ASHPLUMO	1242	
WPDiameter[m]	NFENV	129	
WPInternalVolume[m3]	EBSREL	444	
WPLength[m]	NFENV	128	
WPSpacingAlongEmplacementDrift[m]	NFENV	147	
WPsurfaceScaleThickness[m]	EBSFAIL	264	
WPWeldThickness[m]	EBSFAIL	188	
XLocationInRegionOfInterest[m]	VOLCANO	1216	
XLocationOfFaultingEventInRegionOfInterest[m]	FAULTO	1199	
YearsOfIrrigationPriorToIntakePeriod[yr]	GENTPA	1058	
YieldStrength[MPa]	EBSFAIL	267	
YLocationInRegionOfInterest[m]	VOLCANO	1217	
YLocationOfFaultingEventInRegionOfInterest[m]	FAULTO	1200	
ZyrOxideAndCrudC-14InvPerKgSF[ci]	EBSREL	495	

Files in Data Subdirectory			
File Name	**Contact**	**Date File Last Updated**	Confirmed
bunitdem.dat	R. Fedors	March 22, 2000	
burnup.dat	R. Benke	September 13, 2004	
careadem.dat	R. Fedors	September 25, 2002	
cdepdem.dat	R. Fedors	September 25, 2002	
climato1.dat	R. Fedors	August 15, 1997	
climato2.dat	R. Fedors	August 21, 2004	
coefkdeq.dat	D. Turner	September 14, 2004	
dilution.dat	R. Fedors	December 19, 2002	
drythick.dat	R. Fedors	June 14, 2003	
dsfailt.def	G. Adams	July 3, 2003	
ebsfail.def	O. Pensado	September 8, 2004	
ebsfilt.def	O. Osidele	May 28, 1998	
ebsrel.def	O. Osidele	October 17, 2003	
elevdem.dat	R. Fedors	March 22, 2000	
FILENAME.DAT	R. Fedors	February 11, 2000	
fluoride.dat	O. Pensado	May 29, 2002	
gbioac1.dat	P. LaPlante	February 11, 2000	
gdefauls.def	P. LaPlante	September 4, 2002	
gdefault.def	P. LaPlante	February 11, 2000	
gdosinc2.dat	P. LaPlante	February 11, 2000	
gftrans.def	P. LaPlante	February 11, 2000	
gftranss.def	P. LaPlante	September 4, 2002	
ggamen.dat	P. LaPlante	February 11, 2000	
ggenii.def	P. LaPlante	February 11, 2000	
ggeniis.def	P. LaPlante	September 4, 2002	
ggrdf.dat	P. LaPlante	February 11, 2000	
gnewdf.dat	P. LaPlante	March 29, 2000	
grmdlib.dat	P. LaPlante	March 20, 2000	
ia.dat	R. Janetzke	February 22, 2003	
itym.dat	R. Fedors	December 30, 2002	
maidtbl.dat	R. Fedors	March 29, 2000	
maswtbl.dat	R. Fedors	March 22, 2000	
maydtbl.dat	R. Fedors	December 30, 2002	
mechfail.def	G. Adams	August 21, 2004	
nuclides.dat	O. Pensado	September 11, 2004	
organdf.dat	P. LaPlante	September 24, 2000	
remob_lut.dat	R. Nes	September 23, 2004	
repdes.dat	R. Janetzke	July 19, 2003	
seisbs1.dis	G. Adams	December 17, 2002	x
seisbs2.dis	G. Adams	December 17, 2002	x
smaydtbl.dat	R. Fedors	December 30, 2002	
soildem.dat	R. Fedors	March 22, 2000	
strmtube.dat	J. Winterle	June 21, 2003	
sunitdem.dat	R. Fedors	March 22, 2000	
tefkti.inp	R. Fedors	May 8, 2000	
tpanames.dbs	R. Janetzke	September 26, 2004	
winddem.dat	R. Fedors	March 22, 2000	
wpflow.def	O. Osidele	February 2, 2000	

Parameters Used in TPA 5.0

Auxiliary Files

File Name	Data Expert	File description	Comments
bunitdem.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. The ITYM preprocessor software obtains bedrock type from the data file bunitdem.dat. This DEM assigns a bedrock unit to each pixel in the repository discretization according to the geologic map of Day et al. (1998). The same discretization is used for all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 m × 30 m. Bedrock unit data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of bedrock unit, and so forth for all 300 rows of bedrock type. The first 15 lines and last 5 lines of the file bunitdem.dat are provided below. # DEM of bedrock unit for each pixel, used in ITYM preprocessor software. NROWS 300 NCOLS 199 XLLCORNER 545010 YLLCORNER 4074000 CELLSIZE 30 NODATA_VALUE -9999 1 1 1 1 1 1 1 1 . . . 1 1	Data describe the well-studied surficial geology above the repository, drawing from the report by Day et. al (1998) and using the analysis described by Stothoff in scientific notebook #163. The spatial coverage of this external file needs to be updated using the license application repository footprint instead of the modified EDA-II design currently used by TPA 5.0

burnup.dat R. Benke

This is the description of the file as it appears in the TPA User's Guide, 2002.

The file burnup.dat contains input data on the temporal evolution of thermal outputs from the pressurized water reactor and boiling water reactor wastes. The file also contains information on the mix of pressurized water reactor and boiling water reactor wastes. Thermal outputs are presented in W/MTU. This input data file is read directly by invent.f instead of being read by reader.f. For thermal output as a function of time, the file is read until the end-of-file is encountered.

Bioaccumulation Factor Library - (30-Aug-88) RAP

Salt:	Fish	Crustacea	Molluscs	Plants	Fr:Fish	Crustacea	Molluscs	Plants	Cleanup
AC	30.0	1000.0	1000.0	1000.0	330.0	1000.0	1000.0	10000.	0.7
AM	2500.0	360.0	290.0	2900.0	100.0	100.0	100.0	3000.	0.7
SB	1000.0	100.0	1200.0	100.0	200.0	100.0	100.0	1000.	0.8
BA	10.0	1.0	20.0	100.0	200.0	200.0	200.0	500.	0.4
BE	1000.0	10000.0	10000.0	10000.0	10.0	50.0	50.0	200.	0.2
BI	15.0	1000.0	1000.0	10000.0	15.0	100000.0	100000.0	1500.	0.9
BK	50.0	500.0	20000.0	1.0	50.0	500.0	20000.0	1.0	
BR	10.0	10.0	10.0	10.0	420.0	330.0	330.0	50	.0
CD	2000.0	5000.0	10000.0	1000.0	200.0	10000.0	10000.0	500	0.6
CA	2.0	5.0	1.0	50.0	200.0	2000.0	2000.0	1000.	0.2
CF	50.0	500.0	2000.0	5000.0	25.0	1000.0	1000.0	5000	.0
C	20000.0	20000.0	20000.0	1800.0	9000.0	9000.0	9000.0	4500.0	1.0
CE	100.0	500.0	500.0	5000.0	500.0	1000.0	1000.0	4000.	0.2
CS	100.0	30.0	30.0	700.0	15000.0	500.0	500.0	1000.	0.9
CL	1.0	1.0	1.0	1.0	50.0	50.0	50.0	50.0	1.0
CR	600.0	500.0	1140.0	4000.0	20.0	2000.0	2000.0	4000	.0
CO	100.0	2000.0	3000.0	400.0	330.0	2000.0	2000.0	1000.	0.2

.
.
.

Constant values justified by the low uncertainty and spatial variability expected for these time series which describe the thermal evolution of reactor wastes. Data draw from studies documented by CRWMS M&O (2000, 1993). The spatial coverage of this external file needs to be updated using the license application repository footprint instead of the modified EDA-II design currently used by TPA 5.0 [OBS]

careadem.dat R. Fedors

[New to TPA 5.0]

Parameters describe well-studied surficial features above the repository using information supplied by the US Geological Survey. The current data should be used until TPA 5.0 is updated to reflect the expanded area of the license application repository.

cdepdem.dat R. Fedors

[New to TPA 5.0]

Parameters describe well-studied surficial features above the repository and draw from information in elevdem.dat and soildem.dat. The current data should be used until TPA 5.0 is updated to reflect the expanded area of the license application repository.

climato1.dat R. Fedors

This is the description of the file as it appears in the TPA User's Guide, 2002.

The file climato1.dat contains data utilized by UZFLOW to determine the climatic conditions (i.e., distributions for temperature and precipitation). Specifically, the information in climato1.dat is the distributed perturbation data that are used to calculate the time-varying mean annual precipitation and the mean annual temperature. The data from this file are utilized to add "noise" to mean annual precipitation and mean annual temperature. The first 20 lines and last 5 lines of this file are listed below.

```
-5.7053335e-01
-1.0290445e+00
-1.1575096e+00
 9.8697251e-01
 1.2410360e+00
-3.0644614e-01
-1.9374674e-01
 1.1952564e+00
-1.1220900e+00
 6.9738339e-01
-5.2758746e-01
-8.1619222e-01
-2.0944012e-01
-1.7963021e+00
 8.7311825e-01
-1.4202760e-01
-1.4503307e-01
-5.1493563e-01
-3.9668029e-01
-7.5092842e-01
.
.
.
-8.6848566e-01
```

Source and justification information to be provided.
Possible obsolete or unused file? QA response: "The climato1.dat climate noise was not used in TPA 3.2 and 4.x because the marked changes in flux led to difficulties with NEFTRAN simulations of transport (according to NRC and CNWRA Performance Assessment staff). Testing would be needed to determine if the NEFTRAN limitation still occurs in TPA 5.0. If not, then the data set should be evaluated for updating or clarification of correlation structure"

climato2.dat	R. Fedors	UZFLOW reads three columns of data from climato2.dat. The first column is time in 1,000-years steps from 0 year to 100,000 years. The second and third columns are the fraction of full glacial mean annual precipitation and mean annual temperature, respectively. These data represent the variance from present-day precipitation and temperature conditions (0 at 0 year) to glacial conditions (1 at 50,000 years) and back to the equivalent of present-day conditions at 100,000 years. With these data, calculations performed in UZFLOW generate time-varying climatic conditions that provide distributions for mean annual precipitation and mean annual temperature. The first 21 lines and last 5 lines of climato2.dat are presented below. 0 0 0 1000 0.364364174 0.364364174 2000 0.50775941 0.50775941 3000 0.586599682 0.586599682 4000 0.632253812 0.632253812 5000 0.655878738 0.655878738 6000 0.655878738 0.655878738 7000 0.655878738 0.655878738 8000 0.655878738 0.655878738 9000 0.655878738 0.655878738 10000 0.655878738 0.655878738 11000 0.66734938 0.66734938 12000 0.678820022 0.678820022 13000 0.690290664 0.690290664 14000 0.701761306 0.701761306 15000 0.713231949 0.713231949 16000 0.724702591 0.724702591 17000 0.736173233 0.736173233 18000 0.747643875 0.747643875 19000 0.759114517 0.759114517 20000 0.770585159 0.770585159 . . . 96000 -0.0615372 -0.0615372	Based on revisions (described in the questionnaire response) to the results documented in CRWMS M&O (2000), Mohanty et al. (2002), NRC (1997) and USGS (2000) (EXP, REL). Further revisions may be required, possibly based on the corresponding documents in the DOE license application.
coefkdeq.dat	D. Turner	[New to TPA 5.0]	Source and justification to be specified.

dilution.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. For the residential receptor group, the calculation of the fraction of total plume mass captured from well pumping uses data in dilution.dat. The DCAGW module reads data from dilution.dat and performs linear interpolation to find capture width, capture thickness, and screen length. The dilution.dat file supplies data for well capture width and well capture thickness as functions of pumping rate and aquifer thickness. Additionally, data for the well screen length are provided as a function of pumping rate. The well pumping rate, aquifer thickness, and plume thickness are sampled parameters defined in tpa.inp. Using values for capture width, capture thickness, screen length, and plume thickness, along with the sum of all streamtube widths read from strmtube.dat file, the fraction of the total plume mass captured by pumping is calculated. A complete listing of dilution.dat is presented below.	Source and justification to be provided; likely artificial data slected to meet related specifications in 10 CFR Part 63 (5km to 18km well site?)

```
TITLE: TPA4.0 Wellbore dilution data for the saturated zone.
TITLE: (data from R. Fedors 1/5/98 - prepared by rwr)
TITLE: (Updated 9/99)
** (data must be in the following sequence and format
**  with the same pump rates and aquifer thicknesses
**  for capture width and capture thicknesses - the screen
**  length pump rates can be different than those for
**  capture width and thickness)
**
**
** Number of Values for Pump Rate
  8
**
** Number of Values for Aquifer Thickness
  5
**
**
** Capture Width (meters)
**
**  Pump Rate          Aquifer Thickness
**   (m^3/d)              (m)
```

drythick.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. When the user selects the reflux3 model, calculations performed in the NFENV module utilize the data in drythick.dat. The dry-out zone modeled in the TPA code is the region above the drift and below the condensate zone where heat from the drift vaporizes water that resides in the rock pore volume. This vapor moves upward to the condensate zone where the temperature is below boiling. For water to flow onto the waste package from the reflux zone, the water must either penetrate the dry-out zone or the dry-out zone thickness must be zero. The data in drythick.dat provide the dry-out zone thickness in meters at 18 different time steps beginning at 1 year through 900 years. These values were derived from MULTIFLO simulations performed offline. A complete listing of drythick.dat is presented as follows.	Source and justification to be specified. File obsolete or not used? QA response: "update data, uncertianties not dealt with in TPA 4.0, update to discription, The details of the model that was the basis of the present data is not known. Will provide dryout thickness upon completion of the TEF model with improved represention

```
17
 1   1.0   0.0
 2  10.0   0.1
 3  20.0   1.0
 4  30.0   1.5
 5  40.0   1.7
 6  50.0   1.5
 7  60.0   1.5
 8  70.0   1.8
 9  80.0   2.9
10 100.0   4.6
11 200.0   7.3
12 300.0   7.4
13 500.0   6.6
14 600.0   5.6
15 700.0   4.7
16 800.0   3.8
17 900.0   2.7
18 1000.0   0.0
```

elevdem.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002.	Source and justification to be specified.

The ITYM preprocessor software obtains ground surface elevations (m) from the data file elevdem.dat. A DEM is used to assign a ground surface elevation to each pixel in the repository discretization. The same discretization is utilized to generate all of the DEM files listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in Universal Transverse Mercator (UTM) NAD27 easting and northing (m). The grid size is 30 m × 30 m. Ground surface elevation data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of ground surface elevations, and so forth for all 300 rows. The first 20 lines and last 5 lines of the file elevdem.dat are provided below.

```
# DEM of ground surface elevation [m] for each pixel; used in ITYM preprocessor
software.
NCOLS 199
NROWS 300
XLLCORNER 545010
YLLCORNER 4074000
CELLSIZE 30
NODATA_VALUE -9999
```

Table H-4. Sample from itym.dat file illustrating format of sampling control

```
###### Start of Lithology Merge Information ######

MergeDEMType Bedrock
MergeIDList
1 Qtac
2 Qtc
3 cnw
4 tul
5 tmn
6 tll
```

filename.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. The file FILENAME.DAT contains the path and filenames of the input files used by the GENTPA Version 1.0 called in the DCAGW module. The file format matches that of FILENAME.DAT described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below. 2 grmdlib.dat 3 METADATA.DAT 4 RMDBYELE.DAT 5 ggenii.inp 6 ggenii.out 7 gwork.buf 8 gftrans.inp 9 gbioac1.dat 10 ggrdf.dat 11 genv.in 12 DOSSUM.DAT 13 genv.out 14 DOSE.OUT 15 INTDF.OUT 16 CDEINC.OUT 17 DITTY.OUT 18 INTDF.IN 19 DITTYQA.OUT 20 CDE.OUT 21 gmedia.out . . . 46 SEE2.DAT 47 SEE3.DAT 48 49 WORK2.BUF	No uncertainty; this file contains pointers to other data files used by GENTPA. The other data file names were verified to be correct.

fluoride.dat O. Pensado [New to TPA 5.0]

This file did not exist in TPA 4.0. New information is required. The first 20 lines and last 5 lines of the file fluoride.dat are provided below:

Time[yr]	Fluoride[M]
301 Time steps	
0.0000	0.00000E+00
2.3102	5.01000E-05
4.6744	5.01000E-05
7.0940	5.02000E-05
9.5702	5.03000E-05
12.1044	5.03819E-05
14.6980	5.04000E-05
17.3522	5.05000E-05
20.0686	5.06000E-05
22.8486	5.07000E-05
25.6937	5.07469E-05
28.6054	5.08504E-05
31.5852	5.09000E-05
34.6349	5.10000E-05
37.7559	5.11188E-05
40.9499	5.12095E-05
44.2188	5.13000E-05
47.5642	5.14000E-05
50.9879	5.15000E-05
54.4917	5.16000E-05
.	
.	
.	
96400.0000	2.89380E-03
97300.0000	2.92035E-03
98200.0000	2.94690E-03
99100.0000	2.97345E-03
100000.0000	3.00000E-03

Data source and justification to be specified
QA response states: "This File is generated as function of multifbe.dat and multiaf.dat and input parameters in tpa.inp. This File depends on other data Files and cannot be judged alone."

gbioac1.dat	P. LaPlante	This is the description of the file as it appears in the TPA User's Guide, 2002. The file gbioac1.dat contains bioaccumulation factors used by the GENTPA Version 1.0 code called in the DCAGW module. This file is not currently used, but this option is available. The bioaccumulation factors are used to relate the concentration of radionuclides in aquatic biota to the concentration of radionuclides in fresh and salt water. The file format matches that of bioac1.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.	File no longer used; bioaccumulation not currently included in the modeling for Yucca Mountain

```
Bioaccumulation Factor Library - (30-Aug-88) RAP
Salt: Fish  Crustacea Molluscs  Plants Fr:Fish  Crustacea Molluscs  Plants Cleanup
AC   30.0  1000.0  1000.0  1000.0   330.0  1000.0  1000.0 10000. 0.7 AM   2500.0
360.0   290.0  2900.0   100.0   100.0   100.0 3000. 0.7
SB  1000.0   100.0  1200.0   100.0   200.0   100.0   100.0  1000. 0.8
BA   10.0     1.0    20.0   100.0   200.0   200.0   200.0   500. 0.4
BE  1000.0 10000.0 10000.0 10000.0    10.0    50.0    50.0   200. 0.2
BI   15.0  1000.0  1000.0 10000.0    15.0 100000.0 100000.0  1500. 0.9
BK   50.0   500.0 20000.0     1.0    50.0   500.0 20000.0     1.0
BR   10.0    10.0    10.0    10.0   420.0   330.0   330.0 50  .0
CD  2000.0  5000.0 10000.0  1000.0   200.0 10000.0 10000.0   500. 0.6
CA    2.0     5.0     1.0    50.0   200.0  2000.0  2000.0  1000. 0.2
CF   50.0   500.0  2000.0  5000.0    25.0  1000.0  1000.0  5000 .0
C  20000.0 20000.0 20000.0  1800.0  9000.0  9000.0  9000.0  4500.0 1.0
CE  100.0   500.0   500.0  5000.0   500.0  1000.0  1000.0  4000. 0.2
CS  100.0    30.0    30.0   700.0 15000.0   500.0   500.0  1000. 0.9
CL    1.0     1.0     1.0     1.0    50.0    50.0    50.0 50.0 1.0
 CR  600.0   500.0  1140.0  4000.0    20.0  2000.0  2000.0  4000 .0
CO  100.0  2000.0  3000.0   400.0   330.0  2000.0  2000.0  1000. 0.2
```

ggamen.dat	P. LaPlante	This is the description of the file as it appears in the TPA User's Guide, 2002. The file ggamen.dat contains gamma energies utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file includes gamma energies (MeV/dis) for six energy groups for each radionuclide that are used in finite plume calculations. This file is not currently used, but is an available option. The GENTPA Version 1.0 code currently assumes an infinite plume size. The file format matches that of gamen.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.	File no longer used; plume calculations now performed by the Ashplumo module.

EXTGAM - Gamma Energies by Group for Finite Plume (13-May-90 RAP)(1-26-00 MAS Ag108m added)

```
H 3      0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
BE7      0.00000 0.04976 0.00000 0.00000 0.00000 0.00000
BE10     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
C 14     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
N 13     0.00000 0.00000 1.02001 0.00000 0.00000 0.00000
F 18     0.00000 0.00000 0.98858 0.00000 0.00000 0.00000
NA22     0.00000 0.00000 0.91878 1.27374 0.00000 0.00000
NA24     0.00000 0.00000 0.00000 1.36849 0.00000 2.75275
SI31     0.00000 0.00000 0.00000 0.00089 0.00000 0.00000
P 32     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
P 33     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
S 35     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
CL36     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
K 40     0.00003 0.00000 0.00000 0.15587 0.00000 0.00000
AR39     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
AR41     0.00000 0.00000 0.00000 1.28273 0.00087 0.00000
CA41     0.00041 0.00000 0.00000 0.00000 0.00000 0.00000
CA45     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
```

ggrdf.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

Data regarded as well known values taken from Federal Guidance report No. 12 and consistent with the requirements of 10 CFR Part 63

The file ggrdf.dat contains external dose coefficients utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file contains external dose coefficients for all radionuclides for air submersion, water surface, soil surface, deep soil, and buried waste. The file format matches that of grdf.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

FGR 12 External DCFs(per-Sv/yr per Bq/n) (SJM/PAL) for 43 TSPA Nuclides, (MAS 1-26-00 Ag108m added, daughters updated), (MAS 1-28-00 FGR12 soil surface and air submersion values added)

	FGR12 Air Submersion	Water Surface	FGR12 Soil Surface	Buried 0.15 m	Buried 0.5 m	Buried 1.0 m
n	m^3	L	m^2	m^3	m^3	m^3
C 14	7.06E-12	2.02E-11	5.08E-13	8.89E-19	3.86E-24	3.56E-31
CL36	7.04E-10	1.05E-09	2.12E-11	5.16E-15	1.09E-17	4.80E-21
NI59	0.00E+00	1.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI63	0.00E+00	9.47E-13	0.00E+00	6.96E-24	4.40E-34	0.00E+00
SE79	9.56E-12	1.50E-11	6.53E-13	5.17E-19	2.03E-24	1.33E-31
SR90	2.38E-10	4.90E-10	8.96E-12	1.28E-15	1.41E-18	3.85E-22
Y 90	6.00E-09	1.74E-08	1.68E-10	3.83E-13	3.52E-15	1.31E-17
MO93	7.95E-10	2.08E-09	1.69E-10	0.00E+00	0.00E+00	0.00E+00
ZR93	0.00E+00	7.06E-13	0.00E+00	1.35E-24	3.32E-35	0.00E+00
NB93M	1.40E-10	4.31E-10	2.96E-11	0.00E+00	0.00E+00	0.00E+00
NB94	2.43E-06	3.54E-06	4.83E-08	1.55E-10	1.39E-12	2.13E-15
TC99	5.11E-11	9.35E-11	2.46E-12	4.52E-17	2.44E-21	3.90E-26
PD107	0.00E+00	3.23E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG108M	2.46E-06	6.60E-06	5.05E-08	3.54E-10	6.00E-12	3.29E-14
.						
.						
.						
CM243	1.86E-07	2.62E-07	3.94E-09	2.07E-12	1.12E-15	3.55E-20
PU243	3.25E-08	3.36E-08	7.61E-10	1.92E-13	5.34E-16	1.69E-19
AM243	6.88E-08	6.55E-08	1.69E-09	1.82E-14	1.77E-19	1.11E-25

gnewdf.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

Data regarded as well known values taken from Federal Guidance report No. 11 and consistent with the requirements of 10 CFR Part 64

The gnewdf.dat file contains internal dose coefficients utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file contains age-dependent internal dose coefficients for infant, toddler, preteen, teen, and adult receptor groups based on International Commission on Radiological protection Publication 72 (International Commission on Radiological Protection, 1996), with an alternative adult receptor group based on Federal Guidance Report 11 (U.S. Environmental Protection Agency, 1988). The first 20 lines and last 5 lines of this file are listed below.

Intake-to-Dose Conversion Factors for Inhalation and Ingestion from ICRP72 and Federal Guidance 11 (Sv/Bq) AL 1/24/00, (MAS 1-26-00 Ag108m added), (MAS 1-27-00 new FGR11 values for Bi210, Pb212, Bi212), (PAL 1-27-00 Np238 added)

```
      Infant  Infant  Toddler  Toddler  Pre-teen Pre-teen  Teen     Teen   Adult72
Adult72  AdultFG11 AdultFG11
Nuclide --ing—^—inh—^—ing—^—inh—^—ing—^—inh—^—ing—^—inh—^—ing—^—inh-
-^—ing—^—inh—
start_data
C 14   1.40E-09 1.90E-08 1.30E-09 1.40E-08 8.00E-10 7.40E-09 5.70E-10 6.40E-0
CL36   9.80E-09 3.10E-08 4.75E-09 2.05E-08 1.90E-09 1.00E-08 1.20E-09 8.80E-0
NI59   6.40E-10 1.70E-09 2.65E-10 1.23E-09 1.10E-10 5.90E-10 7.30E-11 4.60E-1
NI63   1.60E-09 4.80E-09 6.50E-10 3.50E-09 2.80E-10 1.70E-09 1.80E-10 1.30E-0
SE79   4.10E-08 2.30E-08 2.35E-08 1.65E-08 1.40E-08 8.70E-09 4.10E-09 7.60E-0
SR90   2.30E-07 4.20E-07 6.00E-08 3.35E-07 6.00E-08 1.80E-07 8.00E-08 1.60E-0
Y 90   3.10E-08 1.30E-08 1.50E-08 6.50E-09 5.90E-09 2.70E-09 3.30E-09 1.80E-0
MO93   7.90E-09 6.00E-09 5.95E-09 4.90E-09 4.00E-09 2.80E-09 3.40E-09 2.40E-
ZR93   1.20E-09 7.00E-09 6.35E-10 5.45E-09 5.80E-10 3.30E-09 8.60E-10 3.30E-0
NB93M  1.50E-09 7.40E-09 6.85E-10 5.20E-09 2.70E-10 2.50E-09 1.50E-10 1.90E-
NB94   1.50E-08 1.20E-07 7.50E-09 1.02E-07 3.40E-09 5.80E-08 2.10E-09 5.20E-0
TC99   1.00E-08 4.10E-08 3.55E-09 3.05E-08 1.30E-09 1.70E-08 8.20E-10 1.50E-0
PD107  4.40E-10 2.20E-09 2.10E-10 1.65E-09 8.10E-11 7.80E-10 4.60E-11 6.20E-
```

grmdlib.dat	P. LaPlante	This is the description of the file as it appears in the TPA User's Guide, 2002.	Well-known physical constants described in the GENII v1.485 user manual (Napier, et al. 1988)

The grmdlib.dat file is the radionuclide master library containing a list of all radionuclides and radiological decay data utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file format matches that of rmdlib.dat described in Napier, et al., 1988, and a summary is included in Table B-2. For more information about this file consult Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

```
Radionuclide Master Library  (11/28/90 RAP)(1-26-00 MAS Ag108m added)
H 3      4.49E+3 1 0 0.0000 0 0.0000  1    ND
BE7      5.33E+1 1 0 0.0000 0 0.0000  4    VY
BE10     5.84E+8 1 0 0.0000 0 0.0000  4    VY
C 14     2.09E+6 1 0 0.0000 0 0.0000  6    ND
N 13     6.92E-3 1 0 0.0000 0 0.0000  7    ND
F 18     7.62E-2 1 0 0.0000 0 0.0000  9    SD
NA22     9.50E+2 1 0 0.0000 0 0.0000 11    VD
NA24     6.25E-1 1 0 0.0000 0 0.0000 11    VD
SI31     1.09E-1 1 0 0.0000 0 0.0000 14    NW
P 32     1.43E+1 1 0 0.0000 0 0.0000 15    SD
P 33     2.54E+1 1 0 0.0000 0 0.0000 15    VD
S 35     8.74E+1 1 0 0.0000 0 0.0000 16    NW
CL36     1.10E+8 1 0 0.0000 0 0.0000 17    ND
K 40     4.67E11 1 0 0.0000 0 0.0000 19    ND
AR39     9.83E+4 1 0 0.0000 0 0.0000 18    ND
AR41     7.61E-2 1 0 0.0000 0 0.0000 18    ND
CA41     3.67E+7 1 0 0.0000 0 0.0000 20  1 VW
CA45     1.63E+2 1 0 0.0000 0 0.0000 20  1 VW
SC46     8.38E+1 1 0 0.0000 0 0.0000 21    VY
```

Requirements in the wild: How small companies do it

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Abstract

Small companies form a large part of the software industry, but have mostly been overlooked by the requirements engineering research community. We know very little about the techniques these companies use to elicit and track requirements and about their contexts of operations. This paper presents preliminary results from an ongoing exploratory case study of requirements management in seven small companies, which found that (a) successful small companies exhibit a huge diversity of requirements practices that work well enough for their contexts; (b) these companies display strong cultural cohesion; (c) the principal of the company tends to retain control of the requirements processes long after other tasks have been delegated; and (d) the evidence rejects the simplistic view of a current "software crisis", as requirements errors for these companies, though problematic, are rarely catastrophic. We develop a number of hypotheses to explain these findings.

1. Introduction

Small companies form a large part of the software industry. For example, in the US, in 2002 (the most recent available figures), the overwhelming majority of software development firms, 95%, had less than 50 employees. They generated 21% of the total income and employed 28% of all employees in the area [12]. These companies are a rich source of technological innovation, and they fill a myriad niches that are either undiscovered or unprofitable for larger firms.

Despite this, the requirements engineering community has mostly overlooked their needs and characteristics. There is not one published paper in the entire history of the Requirements Engineering conferences that deals specifically with the requirements processes of small companies. This may be due to a lack of access to these companies, or to the mistaken assumptions that they are essentially no different than their larger counterparts, that they are a minor component of the economy, or that they do not pose any significant research challenges.

As a community, we know very little about the techniques that these companies use to elicit, track, and communicate their requirements, and about their contexts of operation. This paper addresses this problem by reporting on preliminary results from an ongoing exploratory case study of the requirements techniques of seven small software companies. It provides relevant details about each of the cases we analyzed, discusses the diversity of approaches to requirements engineering that we observed, and lists some implications from our findings for the requirements engineering community.

2. How do small companies do it?

We began this study in response to anecdotal evidence that requirements engineering "in the wild" differs significantly from the practices prescribed in the literature. We had observed that small software companies seem to manage their requirements in ways that bear no relation to what the textbooks say, and what is taught in undergraduate courses. Furthermore, much of the current research (e.g. on requirements modeling, specifications, traceability, etc.) seemed to be irrelevant to these companies.

In order to study this apparent mismatch, we designed a case study of small companies that would provide insights on the following questions:

- How do small companies manage their requirements? In particular, how do they elicit, document, communicate, and track them?
- How does the context of these companies affect them? Which forces shape their requirements management processes?
- Why do these companies adopt some requirements practices and reject others? Could lack of adoption be a problem of diffusion, education, or mismatching goals and

itym.dat	R. Fedors	This is the input file for the ITYM preprocessor used to generate two files used by the UZFLOW module of TPA 5.0, a file with mean values for the log of infiltration and a file with the standard deviations. The output files contain tables for a number of climates, each table contains the spatially variable mean or standard deviation of infiltration. By passing the mean and standard deviation to TPA, UZFLOW can then use a self-consistent sampling scheme, instead of ITYM sampling for uncertainty for the TPA code This is the control file for executing the ITYM preprocessor, which creates spatially dependent tables of mean and standard deviation of net infiltration for selected climates (temperature and precipitation) that span the full expected range of TPA 5.0 climates. The produced tables are interpolated in UZFLOW for the specific climate relevant to the current realization. This is the description of the file as it appears in the TPA User's Guide, 2002. The first 24 lines and the last 5 lines of the input control file itym.dat described in section H-4.1 are provided below. # Input control file itym.dat for ITYM preprocessor software version 1.0, TPA 4.0 ###### Size of Tables ###### num_MAP_table 3 num_MAT_table 5 num_pixel_merge 4 num_realize_per_table 500 ###### Options ###### PathwaySum MaxOnly Sampling Allow RegrForm TPA4 zElevDEM elevdem.dat zWindDEM winddem.dat zSoilDEM soildem.dat zBUnitDEM bunitdem.dat zSUnitDEM sunitdem.dat	Data based on USFIC staff expert judgement, drawing from Flint (1996, 1998) and scientific notebook #163 (S. Stothoff). File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations

expectations?

3. Design and Execution of the Case Study

3.1. Methodology

Our research questions called for a qualitative field study of small software companies. We applied a multiple-case exploratory case study methodology [15]. The intention of an exploratory case study is to gather data with the aim of deriving specific hypotheses for further study. We established criteria for the inclusion of companies to our study, and interviewed key people at all of them. When possible, we visited their office space and examined their documentation and tools. We captured contextual details data, such as office layout and team member demographics and background. We inquired about the requirements processes of each company, and about the place of these processes within their larger project lifecycles.

Our unit of analysis was the software company as a whole, rather than individual projects or teams within them. This choice allowed us to focus on how requirements practices are affected by the culture, business context, and organizational structure of these companies. Note that a software *team* is only part of a company. We have not attempted to examine small teams within large corporations for this study.

3.2. Selection of cases

The study had a purposeful case sampling. Our inclusion criteria were the following:

- The company does software development as a primary activity.
- The company is small. To simplify selection, we chose an arbitrary threshold of companies with less than 50 employees[1].
- The company has been in operation for at least one year, which allows for some settling of its requirements practices.
- For convenience, the company must have offices in Toronto or its metropolitan area.

In recent years, Toronto has experienced a considerable development of its software industry. Many firms have formed an active hi-tech community with frequent gatherings and a high degree of openness. One of the authors of this paper is a well-known participant of this community, and this greatly facilitated the tasks of obtaining access to our cases and of reaching a healthy level of trust for our interviewees to disclose their strengths and problems.

The set of cases described in this paper is extremely diverse. This was not intentional, and it was not part of our selection criteria; rather it appears to reflect the diversity of the software industry in the Toronto area. We did not reject opportunities to include cases in our study due to similarities to other cases in our pool.

3.3. Execution of the study

In our initial contact with each candidate company, we explained that this was a case study of how small software companies manage their projects. Our contacts were generally partners or owners of their corresponding companies; when this was not the case, they were persons holding another leadership position in their organization.

We initially made contact with fourteen companies, and have conducted interviews with twelve of them. When possible, these meetings took place in each company's offices; otherwise we met in neutral environments. Interviews typically lasted between one and two hours, and we held from one to three meetings with each company. At this stage in our study, we have collected detailed data from seven of these firms. The preliminary observations we report in this paper are based on these seven.

Although the interviews had an open structure, we collected information about the following issues: organizational structure, company size, roles of key staff, line of work, types of customers, descriptions of the analysis, sales, negotiation, and development processes, communication of requirements to the rest of the team, documentation, tool support, requirements errors, and misunderstandings between the company and its customers.

4. Description of the cases

We present a brief description of each of our cases. Throughout the paper we will use pseudonyms for the companies, to protect their anonymity. A summary of some of our observations appears in Table 1, at the end of this section.

4.1. Endosymbiotic

Endosymbiotic is a small open source company that specializes in applications for the health business. It currently employs seven people, including its two founders. Its main customer, a general hospital, grants

[1] In studies of the computer industry in North America, the definition of a small software company is one with an income of less than US$23 million [13]. None of the companies we studied had an income more than 1/10th of this.

maidtbl.dat R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002. Obsolete file; replaced by maydtbl.dat

The module UZFLOW obtains mean annual infiltration (mm/yr) from the data file maidtbl.dat for a range of precipitation and temperature values. The six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celcius) are listed as VAR1 and VAR2 followed by the infiltration values (mm/yr) corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right comprise tl

```
# DEM table of expected MAI [mm/yr] for each pixel
# Table is a function of mean annual precipitation [mm/yr] and MAT [C]
# Coordinate system is UTM NAD27 [m]
# File generated on Thu Mar 23 06:47:17 2000
NCOLS     49
NROWS     75
XLLCORNER  545010.000000
YLLCORNER  4074000.000000
CELLSIZE     120.000000
NODATA_VALUE    -9999.000000
VAR1  1.0000000E+02
VAR2  0.0000000E+00
 7.23192569E+00
 8.11515613E+00
 8.57002278E+00
 8.79862242E+00
 8.60854144E+00
 7.50135501E+00
 9.37095935E+00
 9.73997409E+00
```

them the use of office space in its own grounds and interacts closely with them for requirements elicitation. This arrangement is highly valued by the partners, since it allows for frequent interactions with their users, paying customers, and costly medical devices.

Endosymbiotic's projects grow incrementally, and although they have an abstract set of goals, they have not been articulated in detail, since they shift depending on new technical requirements, regulations, and the strategic vision of the hospital's management.

Requirements come from three main sources: Standards, domain experts, and past experiences. It should be noted that everybody in the team worked for another company in the same business before starting Endosymbiotic. In a way, they are re-building a system that they had previously developed, and they understand many of its requirements and challenges.

The company loosely applies the Scrum [11] approach to communicate requirements to the team and assess progress: First, each project has a "product backlog" (a list of pending features, described with little detail) that acts as a sort of requirements document. Second, the team holds a "daily Scrum", a 15 minutes long, standing-up meeting, in which each team member reports on their current progress and plans. Third, a monthly demo gives visibility of the projects' status to everyone in the team and to hospital representatives, and allows for a prioritization of the features in the backlog.

Endosymbiotic's employees do not usually communicate requirements information through documentation. They use face-to-face interactions as their main means of communication. When they model their system designs, they tend to do so informally in whiteboards, without regard for proper notation syntax. Their drawings are usually photographed and posted in a website accessible to the full team.

Most people in Endosymbiotic have been working together for several years. They know one another's skill sets, and are familiarized with their loose agile methodology, which they decided to adopt as a group. Experiments in bringing new people to their team have not been successful – recently, for instance, a new employee from a different environment left the company two weeks after joining.

4.2. Agilista

Agilista follows extreme programming (XP) [2] closely, in both letter and spirit. It is a small software house formed by four people, all with an engineering background, and most of them with experience working in far larger corporations. It provides software consulting and development, mainly in the industrial automation area. Its projects and customer relations are long-term (projects often last over 2 years), and the company works on 2-3 projects at a time. Agilista is enthusiastic about its methodology and programming language of choice (Python), and rejects projects that do not fit with these choices.

Agilista's projects have no official end date or quote. The company gets paid as they go along, until the customer decides to stop the project. They do not write requirements documents. Instead, they produce a list of "stories", which can be a sentence long, and in which planning and effort estimation are based.

In the only noticeable divergence between Agilista's processes and XP, a senior consultant from the company (usually its principal) acts as the customer on-site for the rest of the team, after having interviewed people at the customer's site and acquired some domain expertise.

The company explores the requirements of their projects with throwaway prototypes that are ready at the end of the first iteration of the project (two weeks after kick-off). Agilista's principal admits that the company is happy to discard the results of this first iteration as long as it teaches them something about their project.

The list of user stories is modified and re-prioritized after each iteration, between the customer and the team members. The vague phrasing of some of the stories of a project is often clarified for the developers by the consultant acting as customer proxy, who in turn contacts the customer whenever needed. It is through these informal exchanges that requirements are communicated to the team. Furthermore, Agilista's open space layout fosters plenty of quick interactions among its employees, leading to a greater shared understanding of their status and projects.

4.3. Spark

Spark's offices, with their wide, open spaces, quirky gadgets, toys, and open kitchen, suit the image of a creative agency more than of a software company. However, their offerings are highly specialized and algorithmically complex products and web services for news corporations and publishers.

Spark currently employs 19 people, with 11 of them involved in software development. Due to the complexity of its code, it requires that several of its programmers have a graduate Computer Science degree.

The firm does not have a structured requirements management process. Feature requests are rarely documented. To define the requirements of their next release, the company's partners meet face to face with

maswtbl.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. Table mean annual clear-sky shortwave radiation [W/m2] values for different ground orientations used by ITYM to calculate actual incoming shortwave radiation incident on the ground surface for each pixel across net infiltration domain. Increments in north-south and east-west (YVLLCORNER, XVINCREMENT) are in degrees. The table describes a function of ground surface rotation using east-west rotation (degrees from horizontal) as the row-wise interpolating variable. Similarly, north-south rotation (degrees from horizontal) is the column-wise interpolating variable. The parameters XVLLCORNER and YVLLCORNER span the entire 180 range. The first 35 lines and last 5 lines of the file maswtbl.dat are provided below. # Mean annual clear-sky shortwave radiation [W/m2] as a function of ground orientation; used in ITYM. NROWS 37 NCOLS 37 XVLLCORNER 90 YVLLCORNER -90 XVINCREMENT -5 YVINCREMENT -5 172.013 155.679 138.16 119.845 102.119 84.1245 66.7618 50.0491 34.5612 20.5591 9.07223 1.93457 0.0141618 0 0	Uses standard, well-accepted equations documented in scientific notebook #163 (S. Stothoff) and confirmed in scientific notebook #227 or #432 (R. Fedors), with data from the Desert Rock meteorological station near Mercury, Nevada (OBS)

potential customers to find out their underlying needs in a sales/negotiation process that sometimes extends for a full year.

From these meetings and the consideration of Spark's own long term strategic goals, a small team at the company gives shape to the vision and features for the next release. The result of this process is not documented either. Rather, it is communicated verbally to the development team, which will make loose effort estimates based on this information.

The only routine practice the team follows is a daily standing-up status meeting, which lasts for 15 minutes, at the end of the day. Other than that, Spark's strategy may be described as follows: hire competent, creative, smart people; let them know what we want to do, and let them figure out how to do it themselves.

Spark's office space and the traits of its members suggest that the company has developed a personality that would probably reject any attempt to become structured. When we pointed out to one of the partners that this admittedly informal (if currently successful) approach might lead to trouble as his company grows, he responded that for them growth does not have a high priority: *"We're not going to become an IBM"*.

4.4. Bespoker

Bespoker is a 40-45 person software company that develops tailored enterprise applications for banks, insurance companies, and other large corporations. Of all the companies we studied, this was the one that most closely resembled typical views in the requirements literature of how requirements engineering should be done.

The partners at Bespoker appear to be convinced of the need of upfront analysis work before coding, and of the strengths of writing things down (for them, sharing knowledge is *"a matter of documentation"*). Broadly, their process is similar to the Rational Unified Process (RUP) [8], and it works as follows:

Projects start with a paid discovery phase. For small projects (4-6 months), this phase lasts a few weeks; for larger projects (up to 2 years), it may extend to 3-4 months. During this phase, one to three team leaders from the firm meet frequently with their customers to write a detailed specification, where every screen and business rule is described. This was the only company in our study that uses UML diagrams (use cases, class and sequence diagrams, statecharts) to some extent to document their specifications. For large projects, the specification consists of hundreds of pages of screens, business rules catalogues, and models.

Bespoker's partners claim that this process allows them to understand their projects clearly, and to estimate them within 10% of their actual performance.

These documents are reviewed at two levels by the customer (a business and a technical sign-off), a standard practice for contracts with corporations of the kind that the company deals with. After the sign-offs, the iterative development phase begins. To communicate the project's requirements to the team (which could be of 8-18 people), the team leaders produce a developer handbook that explains the specification and is available to the full team in a wiki for easy modification.

These documents do not deal with software design. The company does not want to have detailed design documents, claiming that *"80% of the benefit of design documentation is at the high level"*, and that at a lower level they have not found anything as efficient as simply writing code.

4.5. PhoneOffshore

PhoneOffshore is a provider of applications for mobile services with millions of subscribers, and its clients are large telecommunication corporations. The firm has between 20 and 25 employees distributed between their headquarters at Toronto and an offshore development office. Each of the company's projects takes around 6 months for 5 people – since, according to the CEO, *"less than that is boring and unprofitable, and more than that won't scale"*.

For PhoneOffshore, the requirements process is tightly woven with the negotiation process (*"sometimes they tell us what they want, sometimes we decide"*), and is largely performed to protect the company legally and to satisfy the expectations of its customers. During this stage, PhoneOffshore maintains two persons as liaisons to the customer: one technical, and one business relations. The technical liaison, who is also the project leader, talks to several groups of stakeholders to find their needs and to negotiate the requirements of the system. Some of the documents produced at this stage are legally binding, and negotiating them with the customer may take about a year for large projects. Even after the documents are signed off, the company admits that "requirements are never nailed down". In some cases, negotiating what the contract meant is a full-time job.

The project leader is also in charge of communicating the requirements to the team. He produces specifications of modules as needed, and a project plan to be used mainly as a reference by the developers. These project plans are not comprehensive, and whenever a developer picks up a work unit, he will

maydtbl.dat	R. Fedors	The module UZFLOW obtains mean log10 annual infiltration (mm/yr) from the data file maydtbl.dat for a range of precipitation and temperature values. The first six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celsius) are listed as VAR1 and VAR2 followed by the log10 infiltration values (mm/yr) corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right comprise the next set of soil depths, and so forth for all of the rows of the log10 infiltratior	Data based on USFIC staff expert judgement, drawing from itym.dat basecase input for ITYM. File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations. Data updates will be needed to match the license application repository footprint
multifaf.dat	L. Browning		Source and justification to be specified? Obsolete file? QA response: "SOURCES: Litchen et al. Lookup Table has been supplanted by more recent data and approach in TPA 5.0 Data in new file is addressed in the questionaires for chemical parameters (lower bounding values only)"
multifbe.dat	L. Browning		Obsolete file: see code revision SCR 478

```
# DEM table of expected log10(MAI [mm/yr]) for each pixel
# Table is a function of MAP [mm/yr] and MAT [C]
# Coordinate system is UTM NAD27 [m]
# Run started Fri Dec 20 15:18:01 2002
NCOLS      49
NROWS      75
XLLCORNER  545010.000000
YLLCORNER  4074000.000000
CELLSIZE   120.000000
NODATA_VALUE  -9999.000000
VAR1  1.0000000E+02
VAR2  0.0000000E+00
 1.84727232E-01
 2.76993825E-01
 2.97543201E-01
 3.11149514E-01
 2.91550381E-01
 2.58269354E-01
 3.41522453E-01
 3.56020867E-01
```

contact the project lead to find out its implementation details. These discussions occur through email, instant messaging, and phone between the headquarters and the offshore office. The two offices do not have a considerable time zone difference, and communication usually occurs during business hours.

All of PhoneOffshore's projects are built upon a homegrown framework for mobile applications. This framework neatly modularizes every project's architecture, and the company sees it as one of its main strengths. In parallel to their normal operation, a small and trusted group at the company continues to improve its framework for the benefit of all of its projects.

4.6. Growing Web

Growing Web is a 5-person web development and consulting start-up that focuses on content management applications. They serve a wide variety of customers, and though on occasions they develop long-term projects, they also take very small projects that they can complete in as little as four hours.

This variation causes the company to have a flexible approach to process. For small projects, it is very loose. The company's owner talks to the prospect, quickly reaches an agreement, and informs his company's office manager. She, in turn, schedules the task and passes the relevant information to a developer in an email or a bug report. There are no other requirements documents produced for these projects.

For larger projects, the company follows a process resembling a waterfall model. In the sales process (the company sees this as sales, rather than requirements analysis), the owner talks to a potential customer for about an hour, and creates a rough estimate of the project's tasks and effort. This process is not paid by the customer, and it is usually done quickly. Their business model depends on the owner producing cost estimates efficiently: If they refused to work this way they could lose the project to a more flexible company.

If the prospect accepts the estimate, either the company's owner or the developer in charge of the project writes an Architecture and Design document, which is concerned essentially with the project's requirements and is read by the developers, the office manager, and the customers.

Once the document has been approved by the customer, the development phase begins. The requirements of the project are communicated to the team in a kick-off meeting, in which the owner discusses the client's needs and the list of features required. Later, when development has started, informal exchanges at their open space facilitate the clarification of requirements.

Although every project that Growing Web takes is different, most of them fall in the same domain, and the company uses its past experiences and tools to build it. In particular, almost all of their projects use a homegrown framework for web content management. In a way, the company works on the same "product" at all times, adjusting it to satisfy the needs of their current customers. When they stray from their main domain they have a steeper learning curve to go through, and riskier projects. The framework seems to have been completely assimilated in the team's heads: Whenever a client mentions that they want a website with a particular feature, the team translates that into terms that their framework handles, and even educate their clients to use the same terms.

4.7. Rentcraft

Rentcraft is a 25-people provider of rental management systems. Their team works on releases that take from 9 months to a year. It has two visible leads: a product manager, who acts as the customer liaison for the team, and a project leader, who coordinates progress.

For each release, their list of requirements considers buying criteria (features that customers want to see), usage criteria (features that customers take as default), and strategic criteria (features that allow the company to evolve the product in a direction they believe will be profitable). Initially, the list of requirements is about twice as long as what the team will be able to produce for the next release. Nevertheless, the list is passed on to the developers, who write an "Analysis and Estimation" (A&E) document, in which they informally discuss implementation alternatives for complex requirements, identify relevant uncertainties, and estimate the effort required for each feature.

When the A&E document is ready, the product manager and the project leader jointly choose the features that will be implemented in the next release, selecting only as many as it is feasible to implement given their resources. The result of this process is the "product requirements document" for the release.

For a company that sells products, such as Rentcraft, the requirements have a different emphasis than for companies that provide bespoke services. According to their product manager, *"the worst thing that can happen to us is not that nobody buys our software, but that one customer buys it"*, which would force the company to provide maintenance for it. For this reason, validation of the release's requirements is essential, and the product manager requests feedback from clients through beta tests and meetings.

multiflo.dat	L. Browning	The file multiflo.dat consists of output from a MULTIFLO simulation organized into 14 columns with each line representing one time step. The TPA code uses time and chloride concentration from this file. NFENV reads time from the first column and chloride concentration from the twelfth column. The chloride concentrations are mapped onto TPA time steps, stored in an array, and passed to the EXEC in the NFENV argument list. This array is then passed to the EBSFAIL consequence module and the values written in the file chloridemf.dat. The stand-alone code failt.f reads the chloride concentration from chloridemf.dat and uses this information to calculate the waste package failure time. The first 20 lines and last 5 lines of multiflo.dat are provided below.	Obsolete file; replaced by multifaf.dat and multifbe.dat

```
!date: 3/16/2000 file:copied multiflo output for {time,chloride} onto standard tpa input
format
! property: pH, logO2aq, ...
! Time (years)      delt    pH   72 logO2a  72 ca+2    72 mg+2    72 na+     72 k+      72
h+      72 hco3-   72 sio2(a  72 Cl (molal) so4-2   72 o2(aq)  72
1.00E-08 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
5.42E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.001609 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.004543 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.008452 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.029853 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.070545 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.116320 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.152290 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.200000 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.244820 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.285640 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.331770 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.373280 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.383790 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.388800 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
0.399690 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E-
```

We should point out that the product manager/project leader duo at Rentcraft has been working together for a long time, through several companies, and they have refined their interactions and their processes considerably. It is easy for them to know what to expect from each other. To a high degree, this same team awareness extends to most of their senior developers. For a brief period, the company had another product manager, with different processes and expectations, and he was rejected by the team. Soon afterwards, they rejoined with their old product manager, and the process to which the team was used was reinstated in full.

5. Results and observations

From the preliminary analysis of the data from this case study, we have identified four major findings. In each case, we use the findings to formulate specific hypotheses for further investigation. We discuss each of these in turn.

All the companies included in this study have requirements practices that work for them. They earn enough revenue to stay in business, and in most cases, to grow. Each has survived for a number of years in the risky world of software start-ups. These companies are led by innovative, intelligent people, who are generally knowledgeable about advanced software engineering concepts and have many years experience in the software industry.

5.1. Everyone does RE differently

When we look for common features of their requirements processes that might account for the success of these companies, we find that they all handle their requirements very differently. The diversity is striking. Each addresses the issues of elicitation and communication of requirements with different degrees of planning, structure, and documentation; and yet each considers that their choices are natural.

Several variables appear to affect the requirements practices of these companies: the type of customers, the background and skills of their developers, the preferences of their founders, the nature of their business environment, the spatial layout and geographical distance of their offices, and their number of employees. We found evidence of each of these factors at play in at least some companies. However, we do not yet have sufficient evidence about the strength of influence of each factor in the various

Table 1 - Cases summary

	Endo-symbiotic	Agilista	Spark	Bespoker	Phone-Offshore	Growing Web	Rentcraft
Company Size[1]	7	4	19	40-45	20-25	5	25
Longevity	15 months	13 years	5 years	5 years	7 years	3 years	12 years
Customers	Hospital	Manu-facturing	News agencies & publishers	Banks & corporations	Telecoms	Varied (content managemnt)	Rental companies
Type of offering[2]	Product, service	Projects	Product, service	Projects	Projects	Projects	Product
Project length /Release cycle	1 month	2 weeks	1 year	4 months – 2 years	~6 months	4 hours – 3 months	9 months – 1 year
Key requirements documents	Product backlog	Product backlog, user stories	*None*	Spec, development handbook	Statement of work, project plan	Cost worksheet, arch&design	Analysis & est., product reqs descrip.
Signs of adaptation to niche	Co-location with customer	*Insufficient data*	Year-long negotiation processes	*Insufficient data*	Homegrown framework	Homegrown framework	*Insufficient data*
Cultural Cohesion	Previous company	Engineering	CS PhDs & MScs	Previous companies	Language & country	*None*	Previous companies
Analyst	Founder	Founder	CEO/CIO	Project lead	Project lead	Founder	Product manager
Mitigation of requirements errors	Monthly demos	Iterations	Iterations	Upfront analysis, iterations	Negotiation	*None apparent*	Upfront analysis, beta testing

Notes: 1. Company sizes are approximate for cases where the company is currently recruiting and hiring new staff. 2. We categorized the company's activities according to where the requirements originate: "Projects" are custom development projects with a specific customer and limited duration, "Products" are applications intended for a wider market, and "Services" are long-term engagements (e.g web services).

nuclides.dat	O. Pensado	This is the description of the file as it appears in the TPA User's Guide, 2002. The file nuclides.dat contains radionuclide-specific information and is read by the invent.f module. The file provides indices identifying nuclides, names of radionuclides and radioelements, molecular weights (isotopic weights) in g/mol, half-lives in years, EPA limits (unitless), and inventories in Ci/MTU. This file contains information for 43 radioniclides and serves as the radionuclide database for the TPA code. The contents of the nuclides.dat file is presented here in its entirety. TITLE: TPA4.0 nuclide data used for the invent.f module. TITLE: (data extracted from invent.f - prepared by jmm) ** idx = Nuclide index ** NIS = namesisotopesave ** NES = nameselemsave ** CPMTU@10 = cipermtuat10yr ** — = unitless ** Number of nuclides to be read follows: 43 **idx, NIS, NIS2, NIS3, NES, wmole, halflife, epalim, CPMTU@10 **— —, —, —, —, [g/mol], [yr], [Ci/MTU], [Ci/MTU] 01 U238 U238 U238 U 238.0d0 4.468d9 0.10 3.15d-01 02 Cm246 Cm246 CM246 Cm 246.0d0 4.731d3 0.10 1.76d-01 03 Pu242 Pu242 PU242 Pu 242.0d0 3.869d5 0.10 2.37d+00 04 Am242m Am242m AM242M Am 242.0d0 1.520d2 0.10 1.19d+01 05 Pu238 Pu238 PU238 Pu 238.0d0 8.774d1 0.10 3.67d+03 06 U234 U234 U234 U 234.0d0 2.445d5 0.10 1.25d+00 07 Th230 Th230 TH230 Th 230.0d0 7.700d4 0.01 1.48d-04 08 Ra226 Ra226 RA226 Ra 226.0d0 1.600d3 0.10 4.50d-07 09 Pb210 Pb210 PB210 Pb 210.0d0 2.230d1 1.00 6.49d-08 10 Cm243 Cm243 CM243 Cm 243.0d0 2.850d1 0.10 3.00d+01 11 Am243 Am243 AM243 Am 243.0d0 7.380d3 0.10 2.89d+01 12 Pu239 Pu239 PU239 Pu 239.0d0 2.406d4 0.10 3.36d+02 13 U235 U235 U235 U 235.0d0 7.038d8 0.10 1.78d-02 14 Pa231 Pa231 PA231 Pa 231.0d0 3.277d4 0.10 2.83d-05 15 Ac227 Ac227 AC227 Ac 227.0d0 2.177d1 0.10 7.97d-06	Best available data from a recent DOE update. Data for DSNF based on data extracted from Lwr Radiological Database; see "Inventory Abstraction ANL-WIS-MD-000006 REV 00 ICN 02, 2001" "PWR Source Term Generation and Evaluation BBAC00000-01717-0210-00010, REV 01" "SN0012T0810599.039"
organdf.dat	P. LaPlante	[New to TPA 5.0] This data file supports the calculations in DCAGW related to groundwater protection. Groundwater protection requirements require calculation of both individual organ doses and whole body effective dose. The data in this file are factors that convert ingestion of radionuclides in drinking water to organ doses and whole body dose. The organs include gonad, breast, lung, marrow, bone surface, thyroid, and remainder. The source document for the data is Federal Guidance No. 11 (U.S. Environmental Protection Agency, 1988). Due to uncertainties regarding the chemical form of the ingested radionuclides, the highest values reported are selected for each radionuclide for instances where more than one set of values for a radionuclide are offered in the source document	Data are taken from Federal Guidance report No. 11 (U.S. Environmental Protection Agency, 1988); the use of constant values is consistent with the regulatory requirements in 10 CFR Part 63

cases.

Hypothesis: *The diversity of RE practices in small companies can be explained as the result of evolutionary adaptation, as these companies have adapted to a specific niche.*

According to this hypothesis, we can view the software industry as an eco-system. It would appear that, over time, differentiation occurs when companies adapt their requirement strategies to fit a particular ecological niche. Natural selection reinforces this process if companies survive in a competitive environment by being better adapted to a particular niche than others.

The implications of this hypothesis for requirements engineering research are interesting. If the hypothesis is correct, no generalized requirements technique will be suitable for all small companies. The value of any novel requirements technique will vary significantly depending on the context of the company. Ideas from RE research will not successfully transfer to small companies unless they are tailored to the particular context of the company. Just as a requirements analyst must understand the specific needs of her customers, the RE researcher must understand the varied needs of software companies: context is essence.

Further work is needed to test this hypothesis, and if it is correct, to investigate the forces that shape the evolution. It is still unclear whether it is the software company that specializes to a niche, or the niche that adapts to the company, or both. For example, companies may select requirements practices that suit their customers, or the customers may choose whom to work with based on how competing companies approach the requirements process. Our initial data indicates some support for both of these accounts.

Just because they are adapted doesn't mean there is no room for improvement. While each of the companies we studied has a requirements process that works well enough currently, these may not be robust enough to survive as the company grows, or as the business environment itself evolves.

5.2. Cultural Cohesion

A second striking observation about the companies we studied is the high degree of cultural cohesion they exhibit. In almost all cases, social characteristics shared by the group enabled it to simplify the tasks of requirements communication and coordination. Specifically, we observed cultural cohesion occurring in the following forms:

Homophily: A phenomenon that manifests as homogeneity in a social network, caused by a natural attraction of its members to similar individuals [10]. We found several instances of homophily in our cases (Agilista's shared engineering and professional background and PhoneOffshore's prevalence of employees of the same minority, among others). This homogeneity may increase the efficiency and reliability of communication, and make it easier to develop a shared understanding of the requirements.

Long term collaborations: In several cases, a notable characteristic was the long term collaboration between several of a company's members across firms. These relationships (e.g. Rentcraft's product manager / project leader duo, Endosymbiotic's full team forking from a different company, Bespoker's partners collaboration through almost two decades) enables a deeper understanding of the work style of one's colleagues, and a better estimation of their capabilities.

Rejection of radical change: For many of these companies, their current requirements practices were negotiated, agreed, and settled in the past. Newcomers that intend to change processes significantly, or that do not accept established practices, have on occasion been received with hostility and did not last long.

These phenomena lead us to suggest the following competing hypothesis to explain the diversity in the requirements processes of the companies in our study:

Hypothesis: *The choice of RE practices is irrelevant for small companies with strong cultural cohesion, as the efficiency of team dynamics overrides any benefits based on process.*

If this hypothesis is correct, it implies that the real goal of RE research should not be the creation of requirements techniques, but the study of the means through which teams acquire a shared understanding efficiently. Teams that have achieved strong cohesion do not need new requirements techniques because they have no problems achieving a shared understanding of the requirements. On the other hand, a team that lacks this cohesion might be able to overcome the problem through processes and documentation.

This hypothesis offers an alternative explanation of the diversity of RE practices than the evolutionary account given in the previous section. If culturally cohesive teams can succeed with arbitrary requirements practices, then adaptation to a business niche is no longer needed to explain the diversity we observed. The diversity occurs because, for these companies, anything works.

5.3. The CEO is the requirements engineer

For small company owners, requirements processes may well be one of the firm's most important activities: They rarely give away the role of requirements analyst to their employees. In four of our

repdes.dat	R. Janetzke	This is the description of the file as it appears in the TPA User's Guide, 2002. The data file repdes.dat contains the coordinates defining the repository outline. The reader.f module uses the data in this file to compute the coordinates for the drift endpoints that are written to the drifts.dat file. The coordinate pairs in repdes.dat represent universal transverse mercator easting and universal transverse mercator easting northing in meters for the repository outline. The last point of the outline must be the same as the first to fully close the polygon. This discretization is illustrated in Figure 5-1. Information provided in the tpa.inp file to define the subarea coordinates must coincide with the repository outline coordinates presented in this file. If the subareas are larger than the repository outline, then the subareas will be partially filled since the drifts are restricted to the repository outline. The subareas are smaller then the repository, then not all of the emplaced waste will be accounted for in the full set of subareas. This file also provides the angle (in radians) of inclination of the drifts with respect to the e The drift placement starts in the first emplacement block. If the number of drifts exceeds TITLE: TPA 4.0 repository design and emplacement data. ** ** angle - radians ** -.304d0 ** ** rep outline vertices. ** 13 547645.27,4079656.06 548588.98,4079377.55 548569.32,4078981. 548504.06,4077664.24 548479.71,4077173.06 548455,4076674.51 548155.7,4075962.63 547897.79,4076045.46	Repository design data from repository geometry file; avaliable when Bret Leslie receives data from DOE [OBS]
seisbs1.dis	G. Ofoegbu	[New to TPA 5.0] Scientific notebook 410, page 28 describes the input parameters used to create the file. A description of the sampling zone(and parameter rational) by MECHFIAL is included on pages 4-23 and 4-25 of MECHFAIL: a Total-System Performance Assessmetn Code Module for Evaluating Engineered Barier Performance under mechanical loading codition (Gute et. al. 2003)	No uncertainty; based on knowledge of similar systems (EXP; see Gute et al. 2003)

seven cases, a founder or the CEO of the firm does the requirements engineering. In the other three cases, a trusted senior figure in the company (a project leader or a product manager) takes these responsibilities.

We offer two complementary explanations for this phenomenon:

Hypothesis 1: *The skillset needed for successful requirements engineering is a subset of the skillset for successful entrepreneurship.*

In most of our cases the companies do not distinguish between the role of a "requirements engineer" and that of a "customer liaison". The person eliciting requirements is usually the face of the company, and all communications are channelled through this role. The requirements engineer, then, is often also the company's salesperson and contract negotiator, and needs skills matching these roles.

Hypothesis 2: *Requirements engineering and business strategy are inseparable for small companies.*

For a small company to commit to the development of a project implies locking a proportionally large amount of its available resources. Therefore, requirements work is also strategic management work: The decision of which projects to take or which features to include in the next release of a product is a strategic decision: it will define the company, enable it to exploit its strengths, or lead it through the risk of chartering unknown territory.

These explanations have important implications for our field, which has on occasion attempted to abstract the requirements process away from sales and strategic considerations. If this disconnect remains, it will be unlikely that owners of small companies find our proposed requirements practices applicable to their situations.

5.4. Requirements errors are not catastrophes

Every company that we talked to had stories to share about requirements errors that compromised some of their projects, and they were all aware of the importance of getting their requirements right. And yet, nobody recalled any catastrophes caused by these requirements errors.

This absence of requirements catastrophes contrasts sharply with the commonly accepted perception of a "software crisis", especially one largely caused by requirements problems. We discuss several possible explanations for this disagreement below.

Hypothesis 1: *Small companies that survive their initial phase practice* normal design, *which greatly decreases the risks associated with requirements engineering.*

As we have discussed, these companies are well established, and appear to have adapted to their business niches. An important part of this adaptation may have been a shift from a *radical design* to a *normal design* [14] approach to software development. Each company's specialization allows for the exploitation of skills and knowledge acquired previously, which could decrease the risk of software failures dramatically.

Hypothesis 2: *Small companies can fix their requirements problems more easily than large companies by virtue of being small.*

The scale at which small companies work reduces significantly the size of their projects and their coordination and communication challenges, in comparison to the large corporations which are often the subject of requirements engineering research. In small projects, it is easier to arrange for meetings with every participant and clear misunderstandings. Sharing a (sometimes open) office space also enables valuable information exchanges.

Hypothesis 3: *A single requirements catastrophe will drive a small company out of business.*

It is possible that we did not observe companies that have experienced significant requirements problems because such companies go bankrupt and disappear before we can study them.

Perhaps the most important indicator that requirements errors are not perceived as catastrophic is that they do not prompt these companies to take decisive actions to change their requirements processes. Owners recognize their issues with requirements work, but prefer to take the hits and maintain the processes that have enabled their survival so far, rather than to revolutionize their methods and risk failure.

Our evidence suggests that these companies have each arrived at a different configuration of requirements practices that is "good enough" for their contexts, and that revolutionizing their processes is risky, costly, and unpleasant, in comparison to the alternative of maintaining the inertia that has been profitable to this point. If this observation is correct, it means that small companies will never adopt requirements techniques that demand radical change.

6. Threats to validity

Construct Validity: Our main constructs are the concepts of "small software company" and "requirements management process". Regarding the first, we arbitrarily defined small companies as those with less than 50 employees. This limit is artificial, and might obscure the distinctions between a four-person

seisbs2.dis	G. Ofoegbu	[New to TPA 5.0] Scientific notebook 410 page 28 describes the input parameters (and rationale) used to create the file. A description of the sampling done by MECHFAIL is included on pages 4-23 and 4-25 of MECHFAIL: A total-system performance assessment code module for evaluating engineered barrier performance under mechanical loading conditions (Gute et. al . 2003)	Data derive from a user supplied piece wise CDF (see Gute et al. 2003)
smaydtbl.dat	R. Fedors	The module UZFLOW obtains standard deviations from the data file smaydtbl.dat to be used with the log10 mean annual infiltration (mm/yr) of file maydtbl.dat for a range of precipitation and temperature values. The first six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain (ITYM) preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celsius) are listed as VAR1 and VAR2 followed by the standard deviations of mean annual net infiltration corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right com # DEM table of standard deviation of log10(MAI [mm/yr]) for each pixel # Table is a function of MAP [mm/yr] and MAT [C] # Coordinate system is UTM NAD27 [m] # Run started Fri Dec 20 15:18:01 2002 NCOLS 49 NROWS 75 XLLCORNER 545010.000000 YLLCORNER 4074000.000000 CELLSIZE 120.000000 NODATA_VALUE -9999.000000 VAR1 1.0000000E+02 VAR2 0.0000000E+00 8.44994216E-01 8.09859611E-01 8.16263078E-01 8.20930301E-01 8.20978348E-01 8.03584285E-01 8.23860924E-01 8.43079319E-01	Data based on USFIC staff expert judgement, drawing from itym.dat basecase input for ITYM. File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations. Data updates will be needed to match the license application repository footprint

and a forty-person company. Future studies will probe these differences; for now the limit allows us to explore the characteristics of that underrepresented 95% of companies in the industry.

As for the second construct, our study of requirements management processes was intentionally broad. We studied the processes through which knowledge about a project flows among its stakeholders, and therefore our construct overlaps with activities usually referred to as project management, business administration, sales, and negotiation. Although this implies a lack of precision when describing requirements processes, it enables us to investigate these processes in their natural contexts.

Internal Validity: Our major source of data for this study was the series of interviews we conducted with people at each firm. In most cases, visits to the participants' offices allowed us to corroborate some interview data. However, our reliance on interviews meant that we needed to trust each participant's description of their own processes. Participants may have omitted important facts, or we may have misinterpreted them. Observational field studies will help to uncover these problems, and we will carry them out in the short term as our case study progresses.

External Validity: All of our cases were firms headquartered in Toronto, and this might have generated geographical biases. We do not know if our findings apply to software firms around the world – and given that contextual factors seem to shape companies, the software industry of other cities might exhibit different characteristics. These differences, however, should not change the key insights from our study significantly.

Reliability: We expect that replications of our study should offer results similar to ours. Of course, the characteristics of each company under study will differ from our reports, but the underlying trends and implications should remain unchanged.

7. Related work

Small software development companies have been severely understudied by the requirements engineering community; and in instances when field studies have been reported, the size of the participating companies often goes unmentioned (as many other elements of their context), complicating the history of the field.

Lubars et al. [9] reported, in 1993, a multiple case study of 23 projects in 10 companies. They did not provide data on the size of the companies. The study focused on current practices and the problems these companies face; and they report that nearly all of the key problems were organizational rather than technical. Two years later, El Emam and Madhavji [5] surveyed 60 development projects, all using a particular systems analysis method and support tool marketed by a single company. They focused on the major challenges that these projects faced in their requirements process, and the size of the participating companies was not clear.

In 1997, Gotel and Finkelstein [6] reported on a case study of traceability by tracking the contributions structures of different participants. The case study was conducted in a 25-person "communications" company.

Carter et al. [4] presented a lightweight prototyping technique that was specifically meant to be used by small development teams (up to 12 people). Unfortunately, their emphasis was on team size, not on company size. More recently, John et al. [7] studied the use of domain analysis through a case study of a 14-person company, which was part of a larger consortium of 8 small and medium sized companies and two research institutes. The case study concentrated on how a particular domain analysis technique was used on a project within this company.

Finally, in 2005, Callele et al. [3] studied requirements engineering in the videogame industry. Their data is mainly drawn from industry reports, and it is possible that some of these come from the experiences of small companies, although that was not the focus of the study. In the same year, Alexander et al. [1] presented the results of a survey of requirements practices in several software companies. Size, again, was not in scope, but the study does provide insights regarding the diversity of approaches for requirements in the software industry, which they adjudicate to training, organizational standards, tools, first principles, and the experience of colleagues.

8. Conclusions and future work

This case study found evidence that small software companies have a number of characteristics that distinguish their requirements processes from those of large corporations. These findings challenge many of the common assumptions underlying requirements engineering research.

The findings lead us to offer the following recommendations for the requirements engineering research community:

State the context: Proposed requirements techniques may be ideal for certain contexts, and unhelpful for others. It is important to understand and to state the contexts in which a technique provides the greatest benefit to its users.

Connect RE research to business and social concerns: Requirements practices in small companies are closely tied to culture and business strategy.

soildem.dat	R. Fedors	Description of file appears in Appendix: H The ITYM preprocessor software obtains soil depths (m) from the data file soildem.dat. This DEM assigns a soil depth to each pixel in the repository discretization. The same discretization is used for the soil depth data and the ground surface elevation data in elevdem.dat, and all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM easting and northing (m). The grid size is 30 m × 30 m. Soil depth data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of soil depths, and so forth for all 300 rows of soil depths. The first 20 lines and last 5 lines of the file soildem.dat are provided below. # DEM of soil depth [m] for each pixel; used in ITYM preprocessor software. NROWS 300 NCOLS 199 XLLCORNER 545010 YLLCORNER 4074000 CELLSIZE 30 NODATA_VALUE -9999 0.13615 0.13615 0.435741 0.624657 0.147408 0.258274 0.159285 0.129658 0.170063 0.129678 0.308515 0.125574 0.130158	Calculations (involving a soil balance model) documented in scientific notebook #163 (S. Stothoff) (EXP), using data from the USGS (2001). Data updates will be needed to match the license application repository footprint

Exploring these connections in RE research should lead to significant new insights.

Provide the evidence: Unless there is convincing evidence that a requirements technique is beneficial for a particular context, the corresponding companies are unlikely to risk abandoning the set of practices that have enabled them to survive, in order to obtain unproven benefits.

Provide incremental improvements: Proposals are often offered as monolithic changes in practices. Implementing them has the potential of disturbing the current set of practices greatly, which may have highly negative effects for the company. A safer approach is to offer proposals as incremental improvements that allow a firm to slowly adapt to change, facilitating the adoption of the practice and minimizing risk.

Our case study has not finished. We continue to interact with the participating companies and to incorporate more of them to our pool of subjects. We will investigate, among other things, the rationale that some of these companies have had for making radical changes in their requirements process in the past, and the effect that these changes provoked. We will assess the impact of several contextual variables in adopting a requirements technique; and we will study how strategic and negotiation considerations are incorporated into the requirements processes. Finally, we believe that we have only scratched the surface of the diversity that can be found in small software companies. We expect that a greater number of cases will shed some light into the extent of the specialization that small companies experience to survive in their complex environments.

9. Acknowledgements

We wish to thank the participants of our case study for their invaluable collaboration. Funding for this research was provided by NSERC.

10. References

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strmtube.dat	J. Winterle	This is the description of the file as it appears in the TPA User's Guide, 2002. The data for streamtube widths and lengths as a function of distance to the tuff/alluvium interface are provided in strmtube.dat. Additionally, saturated zone streamtube flow rates are provided in this file. The information in strmtube.dat defines three saturated zone streamtubes. The file is divided into sections for the residential receptor group (referred to as near field) and the farming receptor group (referred to as far field). A distance of 20 km is specified in the strmtube.dat file to represent the far field or the farming receptor group. For convenience, the midpoint between the repository footprint and the far field (i.e., 10 km) is specified as the distance to represent the near field or the residential receptor group. In the total-system performance assessment input file tpa.inp, the distance is set at 10 km to select the residential receptor group and 20 km to select the farming receptor group. The SZFT module utilizes streamtube locations to assign the closest of the three streamtubes to the subarea being analyzed. The distance from the subarea centroid to e When the calculations are conducted for the residential receptor group, only values for th The DCAGW and DCAGS consequence modules also read strmtube.dat. Both DCAGW TITLE: TPA4.0 StreamTube data for the saturated zone. TITLE: (data from J. Winterle 1/10/00) TITLE: (based on flow net analysis using water table contours) TITLE: (reduced number of streamtubes to 3) ** 3 Number of streamtubes. ** ** Flow Rates (m^3/yr/m) ** 3 600. 730. 470. **	Data are constants based on a deterministic model result because uncertainty is handled in the streamtube widrth multipior parameter. Strmtube.dat file is not the latest. TPA version 5 has an updated file that is based on modeling of SZ flow using 3-D MODFLOW; see scientific notebook 170E, chapt, 21

sunitdem.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. The ITYM preprocessor software obtains soil type from the data file sunitdem.dat. This DEM assigns a soil type to each pixel in the repository discretization based on TRW Environmental Safety Systems, Inc. (1997). The same discretization is used for all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 × 30 m. Soil type data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of soil types, and so forth for all 300 rows of soil types. The first 15 lines and last 5 lines of the file sunitdem.dat are provided below. # DEM of soil type for each pixel; used in ITYM preprocessor software. NROWS 300 NCOLS 199 XLLCORNER 545010 YLLCORNER 4074000 CELLSIZE 30 NODATA_VALUE -9999 1 1 3 1 5 5 5 5 . . . 5 5 5 5	Constant values based on USFIC expert judgement (OBS), using data from DOE (1997, 2000). Data updates will be needed to match the license application repository footprint

tefkti.inp	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002.	Data source and justification to be specified

The TPA code user has the option of supplying data for time-varying waste package temperature and relative humidity in tefkti.inp, instead of calculating these values. This option may be selected in tpa.inp by changing the NFENV parameter "TabularTemperatureRHFlag" flag from the default value of 0 to 1. The user must also specify in tpa.inp the parameter "nsetUsedToPickTempRHDataSet," which can range from one to four. This value identifies the data set for waste package temperature and relative humidity values in tefkti.inp, which will be utilized in total-system performance assessment computations.

The file tefkti.inp contains 16 columns that are composed of 4 data sets. Each data set has four columns. These data were generated outside of the TPA code. The user can replace the data sets with different values or provide another data file. However, as currently implemented, the TPA code will read data only from any of the first four sets.

NFENV requires a specific file structure for tefkti.inp. The first line of tefkti.inp provides c

```
Time  Twpnv60 Twnv80ybRHnv60yb
829  999999999 999999999999999999
1.00E-07 2.37E+01 2.37E+01 9.98E-01
3.00E-07 2.37E+01 2.37E+01 9.98E-01
7.00E-07 2.37E+01 2.37E+01 9.98E-01
1.50E-06 2.37E+01 2.37E+01 9.98E-01
3.10E-06 2.37E+01 2.37E+01 9.98E-01
6.30E-06 2.37E+01 2.37E+01 9.98E-01
1.27E-05 2.37E+01 2.37E+01 9.98E-01
2.55E-05 2.38E+01 2.37E+01 9.98E-01
5.11E-05 2.38E+01 2.37E+01 9.98E-01
1.02E-04 2.39E+01 2.37E+01 9.98E-01
2.05E-04 2.41E+01 2.37E+01 9.98E-01
4.10E-04 2.45E+01 2.37E+01 9.98E-01
8.19E-04 2.52E+01 2.37E+01 9.98E-01
1.64E-03 2.63E+01 2.37E+01 9.98E-01
3.13E-03 2.79E+01 2.38E+01 9.98E-01
```

winddem.dat R. Fedors

This is the description of the file as it appears in the TPA User's Guide, 2002.

The ITYM preprocessor software obtains wind speed (m/s) from the data file winddem.dat. This DEM is used to assign a wind speed to each pixel in the repository discretization. The same discretization is utilized to generate all of the DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 m × 30 m. Ground surface elevation data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of ground surface elevations, and so forth for all 300 rows. The first 20 lines and last 5 lines of the file winddem.dat are provided below.

Constants are used because annual averages do not vary significantly (EXP). Calculations documented in scientific notebook #163 (S. Stothoff) using local meteorological data from the Desert Rock meteorological station near Mercury, Nevada. Data updates will be needed to match the license application repository footprint

```
# DEM of wind speed [m/s] for each pixel; used in ITYM preprocessor software.
NROWS 300
NCOLS 199
XLLCORNER  545010
YLLCORNER  4074000
CELLSIZE 30
NODATA_VALUE -9999
3.90536
3.92542
3.981
3.92809
3.78322
3.59776
3.4067
3.31308
3.30678
3.38482
3.3542
3.29629
3.22809
```

- DCAGS -
TPA Parameter Evaluation
(3/18/05)

** DCAGS Parameter Name	Description	PDF Type	Values(s)	Contact	Justification
DepthOfResuspendableLayer[cm]	Thickness of the upper soil layer that is available for resuspension (cm)	constant	0.3	~~MAS~~ RRB	
RateOfReductionOfMassLoadingFactor[1/yr]	~~Rate at which mass load factor goes from value above ash to value above soil following the igneous event. Used in calculations when AshEvolutionMode = 0. Not used when AshEvolutionMode = 1.~~ Rate at which the airborne mass load factor decreases with time from the initial value after the eruption.	constant	0.07	~~MAS~~ RRB	
IndoorShieldingFactor		constant	0.7	~~MAS~~ RRB	
~~AirborneMassLoadAboveFreshAshBlanket[g/m3]~~	~~Mass of soil in the air above a fresh volcanic ash blanket~~	~~loguniform~~	~~1.2e-3, 1.6e-2~~	~~PPL~~ RRB	Delete this obsolete parameter
~~AirborneMassLoadAboveSoil[g/m3]~~	~~Mass of soil in air above Amargosa Valley soil~~	~~loguniform~~	~~5.0e-5, 3.0e-4~~	~~PPL~~ RRB	Delete this obsolete parameter
AirborneMassLoadAboveFreshAshBlanketHeavyDisturbance[g/m3]	Outdoor airborne mass load of resuspended ash due to heavy disturbance activities (g/m^3)	uniform	1.0e-3, 1.0e-2	RRB	
AirborneMassLoadAboveFreshAshBlanketLightDisturbance[g/m3]	Outdoor airborne mass load of resuspended ash due to light disturbance activities (g/m^3)	uniform	1.0e-4, 1.0e-3	RRB	
AirborneMassLoadOutsideHeavyDisturbance[g/m3]	Outdoor airborne mass load of resuspended soil due to heavy disturbance activities (g/m^3)	constant	0.0	RRB	
AirborneMassLoadOutsideLightDisturbance[g/m3]	Outdoor airborne mass load of resuspended soil due to light disturbance activities (g/m^3)	constant	0.0	RRB	
AirborneMassLoadInsideHeavyDisturbance[g/m3]	Indoor airborne mass load of resuspended soil and ash due to heavy disturbance activities	triangular	1.0e-4, 5.0e-4, 1.0e-3	RRB	

** DCAGS Parameter Name	Description	PDF Type	Values(s)	Contact	Justification
	(g/m^3)				
AirborneMassLoadInsideLightDisturbance[g/m3]	Indoor airborne mass load of resuspended soil and ash due to light disturbance activities (g/m^3)	triangular	1.0e-5, 5.0e-5, 1.0e-4	RRB	
AirborneMassLoadOffsite[g/m3]	Offsite airborne mass load of contaminated particles (g/m^3)	constant	0.0	RRB	
OccupancyFractionOutsideHeavyDisturbance[]	Fraction of time receptor spends outdoors with heavy disturbance (unitless)	constant	0.125	RRB	
OccupancyFractionOutsideLightDisturbance[]	Fraction of time receptor spends outdoors with light disturbance (unitless)	constant	0.084	RRB	
OccupancyFractionInsideHeavyDisturbance[]	Fraction of time receptor spends indoors with heavy disturbance (unitless)	constant	0.104	RRB	
OccupancyFractionInsideLightDisturbance[]	Fraction of time receptor spends indoors with light disturbance (unitless)	constant	0.583	RRB	
OccupancyFractionOffsite[]	Fraction of time receptor spends offsite (unitless)	constant	0.104	RRB	

TPA Input Parameters Related to DOSE2 in ASHRMOVO Module With Comments

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
RelativeRateOfBlanketRemoval[l/yr]		constant	0.0007	MAS	ASHRMOVO	1901	OK
FractionOfPrecipitationLostToEvapotranspiration	Fraction of precipitation lost to evapotranspiration	constant	0.68	MAS	ASHRMOVO	1902	OK
FractionOfIrrigationLostToEvapotranspiration	Fraction of irrigation water lost to evapotranspiration	constant	0.5	MAS	ASHRMOVO	1903	OK
FractionOfYearSoilIsSaturatedDueToPrecipitation	Fraction of year blanket saturated due to precipitation	constant	0.0054	MAS	ASHRMOVO	1904	OK
FractionOfYearSoilIsSaturatedDueToIrrigation	Fraction of year blanket saturated due to irrigation	constant	0.2	MAS	ASHRMOVO	1905	OK
AshBulkDensity[g/cm3]	Bulk density for volcanic ash (g/cm3)	constant	1.2	MAS	ASHRMOVO	1906	OK
AshVolumetricMoistureFractionAtSaturation	Volumetric fraction of moisture in volcanic ash at saturation	constant	0.4	MAS	ASHRMOVO	1907	OK
DepthOfTheRootingZone[m]	Depth of rooting zone	constant	0.15	MAS	ASHRMOVO	1908	OK
KdOfUraniumInVolcanicAsh[cm3/g]	U distribution coefficient in volcanic ash (cm3/g)	constant	35.0	MAS	ASHRMOVO	1909	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
KdOfCuriumInVolcanicAsh[cm3/g]	Cm distribution coefficient in volcanic ash (cm3/g)	constant	4000.0	MAS	ASHRMOVO	1910	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfPlutoniumInVolcanicAsh[cm3/g]	Pu distribution coefficient in volcanic ash (cm3/g)	constant	550.0	MAS	ASHRMOVO	1911	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfAmericiumInVolcanicAsh[cm3/g]	Am distribution coefficient in volcanic ash (cm3/g)	constant	1900.0	MAS	ASHRMOVO	1912	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfThoriumInVolcanicAsh[cm3/g]	Th distribution coefficient in volcanic ash (cm3/g)	constant	3200.0	MAS	ASHRMOVO	1913	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfRadiumInVolcanicAsh[cm3/g]	Ra distribution coefficient in volcanic ash (cm3/g)	constant	500.0	MAS	ASHRMOVO	1914	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
KdOfLeadInVolcanicAsh[cm3/g]	Pb distribution coefficient in volcanic ash (cm3/g)	constant	270.0	MAS	ASHRMOVO	1915	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfProtactiniumInVolcanicAsh[cm3/g]	Pa distribution coefficient in volcanic ash (cm3/g)	constant	550.0	MAS	ASHRMOVO	1916	OK -- no distribution information in source data
KdOfActiniumInVolcanicAsh[cm3/g]	Ac distribution coefficient in volcanic ash (cm3/g)	constant	450.0	MAS	ASHRMOVO	1917	OK -- no distribution information in source data
KdOfNeptuniumInVolcanicAsh[cm3/g]	Np distribution coefficient in volcanic ash (cm3/g)	constant	5.0	MAS	ASHRMOVO	1918	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfSamariumInVolcanicAsh[cm3/g]	Sm distribution coefficient in volcanic ash (cm3/g)	constant	245.0	MAS	ASHRMOVO	1919	OK -- no distribution information in source data
KdOfCesiumInVolcanicAsh[cm3/g]	Cs distribution coefficient in volcanic ash (cm3/g)	constant	280.0	MAS	ASHRMOVO	1920	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
KdOfIodineInVolcanicAsh[cm3/g]	I distribution coefficient in volcanic ash (cm3/g)	constant	1.0	MAS	ASHRMOVO	1921	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfTinInVolcanicAsh[cm3/g]	Sn distribution coefficient in volcanic ash (cm3/g)	constant	130.0	MAS	ASHRMOVO	1922	OK -- no distribution information in source data
KdOfSilverInVolcanicAsh[cm3/g]	Ag distribution coefficient in volcanic ash (cm3/g)	constant	90.0	MAS	ASHRMOVO	1923	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfPaladiumInVolcanicAsh[cm3/g]	Pd distribution coefficient in volcanic ash (cm3/g)	constant	55.0	MAS	ASHRMOVO	1924	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfTechnetiumInVolcanicAsh[cm3/g]	Tc distribution coefficient in volcanic ash (cm3/g)	constant	0.1	MAS	ASHRMOVO	1925	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfMolybdenumInVolcanicAsh[cm3/g]	Mo distribution coefficient in volcanic ash (cm3/g)	constant	10.0	MAS	ASHRMOVO	1926	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
KdOfNiobiumInVolcanicAsh[cm3/g]	Nb distribution coefficient in volcanic ash (cm3/g)	constant	160.0	MAS	ASHRMOVO	1927	OK -- no distribution information in source data
KdOfZirconiumInVolcanicAsh[cm3/g]	Zr distribution coefficient in volcanic ash (cm3/g)	constant	600.0	MAS	ASHRMOVO	1928	OK -- no distribution information in source data
KdOfStrontiumInVolcanicAsh[cm3/g]	Sr distribution coefficient in volcanic ash (cm3/g)	constant	15.0	MAS	ASHRMOVO	1929	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfSeleniumInVolcanicAsh[cm3/g]	Se distribution coefficient in volcanic ash (cm3/g)	constant	150.0	MAS	ASHRMOVO	1930	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfNickelInVolcanicAsh[cm3/g]	Ni distribution coefficient in volcanic ash (cm3/g)	constant	400.0	MAS	ASHRMOVO	1931	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.
KdOfChlorineInVolcanicAsh[cm3/g]	Cl distribution coefficient in volcanic ash (cm3/g)	constant	0.25	MAS	ASHRMOVO	1932	OK -- no distribution information in source data
KdOfCarbonInVolcanicAsh[cm3/g]	C distribution coefficient in volcanic ash (cm3/g)	constant	5.0	MAS	ASHRMOVO	1933	CHANGE: Recommend sampling the distribution based on information in source data, as is done for soil Kd's in DCAGW (exact same values used). The source data are lognormal but w/ finite tails so a user defined distribution that closely represents a truncated lognormal is recommended.

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
SolubilityOfUraniumInVolcanicAsh[moles/liter]	U solubility (mol/L)	constant	3.2e-5	MAS	ASHRMOVO	1934	OK
SolubilityOfCuriumInVolcanicAsh[moles/liter]	Cm solubility (mol/L)	constant	1.0e-6	MAS	ASHRMOVO	1935	OK
SolubilityOfPlutoniumInVolcanicAsh[moles/liter]	Pu solubility (mol/L)	constant	1.0e-7	MAS	ASHRMOVO	1936	OK
SolubilityOfAmericiumInVolcanicAsh[moles/liter]	Am solubility (mol/L)	constant	1.0e-7	MAS	ASHRMOVO	1937	OK
SolubilityOfThoriumInVolcanicAsh[moles/liter]	Th solubility (mol/L)	constant	3.2e-9	MAS	ASHRMOVO	1938	OK
SolubilityOfRadiumInVolcanicAsh[moles/liter]	Ra solubility (mol/L)	constant	1.0e-7	MAS	ASHRMOVO	1939	OK
SolubilityOfLeadInVolcanicAsh[moles/liter]	Pb solubility (mol/L)	constant	3.2e-7	MAS	ASHRMOVO	1940	OK
SolubilityOfProtactiniumInVolcanicAsh[moles/liter]	Pa solubility (mol/L)	constant	3.2e-8	MAS	ASHRMOVO	1941	OK
SolubilityOfActiniumInVolcanicAsh[moles/liter]	Ac solubility (mol/L)	constant	1.0e-10	MAS	ASHRMOVO	1942	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
SolubilityOfNeptuniumInVolcanicAsh[moles/liter]	Np solubility (mol/L)	constant	1.0e-4	MAS	ASHRMOVO	1943	OK
SolubilityOfSamariumInVolcanicAsh[moles/liter]	Sm solubility (mol/L)	constant	5.1e-8	MAS	ASHRMOVO	1944	OK
SolubilityOfCesiumInVolcanicAsh[moles/liter]	Cs solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1945	OK
SolubilityOfIodineInVolcanicAsh[moles/liter]	I solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1946	OK
SolubilityOfTinInVolcanicAsh[moles/liter]	Sn solubility (mol/L)	constant	5.0e-8	MAS	ASHRMOVO	1947	OK
SolubilityOfSilverInVolcanicAsh[moles/liter]	Ag solubility (mol/L)	constant	1.0e-4	MAS	ASHRMOVO	1948	OK -- source information selected maximum values to be conservative for groundwater transport, however, this is non-conservative for soil leaching. The value was not changed due to low significance of Ag for igneous risk
SolubilityOfPaladiumInVolcanicAsh[moles/liter]	Pd solubility (mol/L)	constant	9.5e-4	MAS	ASHRMOVO	1949	OK
SolubilityOfTechnetiumInVolcanicAsh[moles/liter]	Tc solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1950	OK
SolubilityOfMolybdenumInVolcanicAsh[moles/liter]	Mo solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1951	OK -- source information selected maximum values to be conservative for groundwater transport, however, this is non-conservative for soil leaching. The value was not changed due to low significance of Mo for igneous risk
SolubilityOfNiobiumInVolcanicAsh[moles/liter]	Nb solubility (mol/L)	constant	1.0e-8	MAS	ASHRMOVO	1952	OK
SolubilityOfZirconiumInVolcanicAsh[moles/liter]	Zr solubility (mol/L)	constant	3.2e-10	MAS	ASHRMOVO	1953	OK

Name	Description	PDF Type	Value(s)	CNWRA Contact	TPA Section	Order for TPA.INP	Comments and Recommendations by P. LaPlante 3/18/05
SolubilityOfStrontiumInVolcanicAsh[moles/liter]	Sr solubility (mol/L)	constant	1.0e-4	MAS	ASHRMOVO	1954	OK
SolubilityOfSeleniumInVolcanicAsh[moles/liter]	Se solubility (mol/L)	constant	1.0e-4	MAS	ASHRMOVO	1955	OK
SolubilityOfNickellnVolcanicAsh[moles/liter]	Ni solubility (mol/L)	constant	1.8e-3	MAS	ASHRMOVO	1956	OK
SolubilityOfChlorineInVolcanicAsh[moles/liter]	Cl solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1957	OK
SolubilityOfCarbonInVolcanicAsh[moles/liter]	C solubility (mol/L)	constant	1.0	MAS	ASHRMOVO	1958	OK
ReceptorGroupArea[m2]		constant	1.5d+07	MAS, PAL	ASHRMOVO	1959	?
** DCAGS					DCAGS	2000	

Note: change all contact to PAL

Name	TPA Section	TPA Order	App. A page number
** ASHPLUMO	ASHPLUMO	1227	
** ASHREMOB	ASHREMOB	1326	
** ASHRMOVO	ASHRMOVO	1248	
** Cladding	EBSREL	575	
** CORRELATED INPUTS	CORRELATED INPUTS	1338	
** DCAGS	DCAGS	1308	
** DCAGW	DCAGW	1039	
** Diffusion	EBSREL	588	
** Disruptive Scenario Flags	SETUP	33	
** DSFAIL	DSFAIL	180	
** EBSFAIL	EBSFAIL	186	
** EBSFILT	EBSFILT	612	
** EBSREL	EBSREL	424	
** FAULTO	FAULTO	1196	
** gentpa	GENTPA	1054	
** Glass	EBSREL	579	
** GLOBAL PARAMETERS	SETUP	1	
** Groundwater Protection	SETUP	65	
** Importance Analysis Flags	SETUP	3	
** NFENV	NFENV	81	
** Nuclides and Chains	SETUP	42	
** Output Print Options	SETUP	59	
** Parameter sampling	SETUP	44	
** SEISMO	SEISMO	276	
** Select Append Files	SETUP	63	
** Simulation Times	SETUP	52	
** Subarea Size	SETUP	38	
** SZFT	SZFT	976	
** UZFLOW	UZFLOW	69	
** UZFT	UZFT	630	
** VOLCANO	VOLCANO	1213	
AA_1_1[C/m2/yr]	EBSFAIL	249	
AA_2_1[C/m2/yr]	EBSFAIL	250	
AirborneMassLoadAboveFreshAshBlanket[g/m3]	DCAGS	1309	
AirborneMassLoadAboveFreshAshBlanketHeavyDisturbance[g/m3]	DCAGS	1314	
AirborneMassLoadAboveFreshAshBlanketLightDisturbance[g/m3]	DCAGS	1315	
AirborneMassLoadAboveSoil[g/m3]	DCAGS	1311	
AirborneMassLoadInsideHeavyDisturbance[g/m3]	DCAGS	1318	
AirborneMassLoadInsideLightDisturbance[g/m3]	DCAGS	1319	
AirborneMassLoadOffsite[g/m3]	DCAGS	1320	
AirborneMassLoadOutsideHeavyDisturbance[g/m3]	DCAGS	1316	
AirborneMassLoadOutsideLightDisturbance[g/m3]	DCAGS	1317	
AlluviumMatrixGrainDensity_SAV[kg/m3]	SZFT	1015	
AlluviumMatrixPoreRadius_SAV[m]	SZFT	1019	
AlluviumMatrixPorosity_SAV	SZFT	1016	
AlluviumMatrixRD_SAV_C	SZFT	1002	
AlluviumMatrixRD_SAV_Cl	SZFT	990	
AlluviumMatrixRD_SAV_Cm	SZFT	992	
AlluviumMatrixRD_SAV_Cs	SZFT	998	
AlluviumMatrixRD_SAV_I	SZFT	986	
AlluviumMatrixRD_SAV_Nb	SZFT	1006	
AlluviumMatrixRD_SAV_Ni	SZFT	1000	
AlluviumMatrixRD_SAV_Pb	SZFT	996	
AlluviumMatrixRD_SAV_Ra	SZFT	994	
AlluviumMatrixRD_SAV_Se	SZFT	1004	

AlluviumMatrixRD_SAV_Tc	SZFT	988	
AlluviumMatrixSpecificSurfaceArea	SZFT	1018	
AlluviumTotalPorosity_SAV	SZFT	1017	
AmbientRepositoryTemperature[C]	NFENV	158	
AmbientSedimentyieldVolumeFromBasin[m/event]	ASHREMOB	1331	
AngleOfVolcanicDikeMeasuredFromNorthClockwise[degreees]	VOLCANO	1220	
AnimalUptakeScaleFactor	GENTPA	1174	
AnnualInfiltrationLossMode(0=Loss,1=LossCalculated)	UZFLOW	75	
AnnualIrrigation[m/yr]	GENTPA	1192	
AnnualPrecipitation[m/yr]	GENTPA	1191	
AquiferThickness5km[m]	DCAGW	1045	
AreaDrainageBasinFluvial[m2]	ASHREMOB	1332	
AreaEolianSourceRegion[m2]	ASHREMOB	1337	
ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	UZFLOW	71	
AshBulkDensity[g/cm3]	ASHRMOVO	1254	
AshEvolutionMode	ASHREMOB	1327	
AshMeanParticleLogDiameter[d_in_cm]	ASHPLUMO	1246	
AshParticleSizeDistributionStandardDeviation	ASHPLUMO	1247	
AshPlumeRealizationIndex[]	ASHREMOB	1328	
AshVolumetricMoistureFractionAtSaturation	ASHRMOVO	1255	
BackfillParticleDiameter[m]	NFENV	88	
BackfillPorosity[]	NFENV	89	
BarrierBiosphereStudy	Importance Analysis	6	
BarrierDriftStudy	Importance Analysis	22	
BarrierInvertStudy	Importance Analysis	25	
BarrierLowerUnsaturatedZoneStudy	Importance Analysis	10	
BarrierReceptorGroupStudy	Importance Analysis	19	
BarrierSaturatedZoneStudy	Importance Analysis	17	
BarrierSpentFuelDissolutionStudy	Importance Analysis	31	
BarrierUpperUnsaturatedZoneStudy	Importance Analysis	8	
BarrierWastePackageStudy	Importance Analysis	27	
BeefConsumptionRate1[kg/yr]	GENTPA	1106	
BeefConsumptionRate2[kg/yr]	GENTPA	1118	
BeefConsumptionRate3[kg/yr]	GENTPA	1130	
BeefConsumptionRate4[kg/yr]	GENTPA	1142	
BeefConsumptionRate5[kg/yr]	GENTPA	1154	
BeefConsumptionRate6[kg/yr]	GENTPA	1166	
BeefFreshForageDietFraction	GENTPA	1089	
BeefFreshForageGrowTime[day]	GENTPA	1091	
BeefFreshForageIrrigationRateCB[in/yr]	GENTPA	1097	
BeefFreshForageIrrigationRatePB[in/yr]	GENTPA	1093	
BeefFreshForageIrrigationTimeCB[mo/yr]	GENTPA	1099	
BeefFreshForageIrrigationTimePB[mo/yr]	GENTPA	1095	
BeginningOfSEISMOWPFailureInterval1[yr]	EBSREL	440	
BeginningOfSEISMOWPFailureInterval2[yr]	EBSREL	441	
BeginningOfSEISMOWPFailureInterval3[yr]	EBSREL	442	
BeginningOfSEISMOWPFailureInterval4[yr]	EBSREL	443	
BFw_Thickness_10SubArea[m]	UZFT	974	
BFw_Thickness_1SubArea[m]	UZFT	911	
BFw_Thickness_2SubArea[m]	UZFT	918	
BFw_Thickness_3SubArea[m]	UZFT	925	
BFw_Thickness_4SubArea[m]	UZFT	932	
BFw_Thickness_5SubArea[m]	UZFT	939	
BFw_Thickness_6SubArea[m]	UZFT	946	
BFw_Thickness_7SubArea[m]	UZFT	953	
BFw_Thickness_8SubArea[m]	UZFT	960	
BFw_Thickness_9SubArea[m]	UZFT	967	
BoilingPointOfWater[C]	EBSFAIL	234	

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BulkingFactorRockTypeOneSubarea_1[]	SEISMO	334	
BulkingFactorRockTypeOneSubarea_10[]	SEISMO	343	
BulkingFactorRockTypeOneSubarea_2[]	SEISMO	335	
BulkingFactorRockTypeOneSubarea_3[]	SEISMO	336	
BulkingFactorRockTypeOneSubarea_4[]	SEISMO	337	
BulkingFactorRockTypeOneSubarea_5[]	SEISMO	338	
BulkingFactorRockTypeOneSubarea_6[]	SEISMO	339	
BulkingFactorRockTypeOneSubarea_7[]	SEISMO	340	
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BulkingFactorRockTypeTwoSubarea_5[]	SEISMO	348	
BulkingFactorRockTypeTwoSubarea_6[]	SEISMO	349	
BulkingFactorRockTypeTwoSubarea_7[]	SEISMO	350	
BulkingFactorRockTypeTwoSubarea_8[]	SEISMO	351	
BulkingFactorRockTypeTwoSubarea_9[]	SEISMO	352	
CalendarYearOfEmplacement[A.D.]	Subareas	41	
CH_Total_Thickness_10SubArea[m]	UZFT	971	
CH_Total_Thickness_1SubArea[m]	UZFT	908	
CH_Total_Thickness_2SubArea[m]	UZFT	915	
CH_Total_Thickness_3SubArea[m]	UZFT	922	
CH_Total_Thickness_4SubArea[m]	UZFT	929	
CH_Total_Thickness_5SubArea[m]	UZFT	936	
CH_Total_Thickness_6SubArea[m]	UZFT	943	
CH_Total_Thickness_7SubArea[m]	UZFT	950	
CH_Total_Thickness_8SubArea[m]	UZFT	957	
CH_Total_Thickness_9SubArea[m]	UZFT	964	
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ChlorideMultFactor	EBSFAIL	261	
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CHnvThickness_1SubArea[m]	UZFT	907	
CHnvThickness_2SubArea[m]	UZFT	914	
CHnvThickness_3SubArea[m]	UZFT	921	
CHnvThickness_4SubArea[m]	UZFT	928	
CHnvThickness_5SubArea[m]	UZFT	935	
CHnvThickness_6SubArea[m]	UZFT	942	
CHnvThickness_7SubArea[m]	UZFT	949	
CHnvThickness_8SubArea[m]	UZFT	956	
CHnvThickness_9SubArea[m]	UZFT	963	
CircumferentialFractionNotCoveredByFloor[]	NFENV	131	
CladC-14InventoryPerKgSf[ci]	EBSREL	494	
CladdingCorrectionFactor	EBSREL	490	
CladdingVelocityEnhancementFactor[]	Cladding	576	
ClimatePerturbationSet	UZFLOW	80	
CoefficientOfVariation[]	NFENV	94	
CoefForLocCorrOfInnerOverpack	EBSFAIL	254	
CoefForLocCorrOfOuterOverpack	EBSFAIL	252	
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ColloidConcentration_STFF[kg/m3]	SZFT	1012	
ColloidReleaseFactor_Ja241[]	EBSFILT	618	
ColloidReleaseFactor_Ja243[]	EBSFILT	616	
ColloidReleaseFactor_Jc245[]	EBSFILT	617	

ColloidReleaseFactor_Jc246[]	EBSFILT	613	
ColloidReleaseFactor_Jp239[]	EBSFILT	615	
ColloidReleaseFactor_Jp240[]	EBSFILT	619	
ColloidReleaseFactor_Jt230[]	EBSFILT	614	
ColloidRetardationFactor_SAV_[m3/kg]	SZFT	1009	
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ComponentOuterContainerStudy	Importance Analysis	29	
ComponentPPwStudy	Importance Analysis	14	
ComponentPrecipitationStudy	Importance Analysis	7	
ComponentSpentFuelDissolutionStudy	Importance Analysis	32	
ComponentTivaCanyonStudy	Importance Analysis	9	
ComponentTSwStudy	Importance Analysis	11	
ComponentUCFStudy	Importance Analysis	15	
ComponentWellWaterStudy	Importance Analysis	20	
Cond_EqvForNaturalConvection[W/(m-C)]	NFENV	169	
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CORRELATED INPUT: SubAreaWetFraction ArealAverageMeanAnnualInfiltrationAtStart[mm/yr]	CORRELATED INPUTS	1340	
CORRELATED INPUT: SubAreaWetFraction MatrixPermeability_TSw_[m2]	CORRELATED INPUTS	1341	
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CritChlorideConcForFirstLayer[moL/L]	EBSFAIL	259	
CritChlorideConcForSecondLayer[moL/L]	EBSFAIL	260	
CriticalRelativeHumidityAqueousCorrosion	EBSFAIL	232	
CriticalRelativeHumidityHumidAirCorrosion	EBSFAIL	231	
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DecayingConstantRadiolysis[1/yr]	EBSFAIL	275	
DefectiveFractionOfWPs/cell	EBSREL	438	
DeflectionDepth[m]	SEISMO	278	
DegradationTimeRocktypeOneSubarea_1[yr]	SEISMO	354	
DegradationTimeRocktypeOneSubarea_10[yr]	SEISMO	363	
DegradationTimeRocktypeOneSubarea_2[yr]	SEISMO	355	
DegradationTimeRocktypeOneSubarea_3[yr]	SEISMO	356	
DegradationTimeRocktypeOneSubarea_4[yr]	SEISMO	357	
DegradationTimeRocktypeOneSubarea_5[yr]	SEISMO	358	
DegradationTimeRocktypeOneSubarea_6[yr]	SEISMO	359	
DegradationTimeRocktypeOneSubarea_7[yr]	SEISMO	360	
DegradationTimeRocktypeOneSubarea_8[yr]	SEISMO	361	
DegradationTimeRocktypeOneSubarea_9[yr]	SEISMO	362	
DegradationTimeRocktypeTwoSubarea_1[yr]	SEISMO	364	
DegradationTimeRocktypeTwoSubarea_10[yr]	SEISMO	373	
DegradationTimeRocktypeTwoSubarea_2[yr]	SEISMO	365	
DegradationTimeRocktypeTwoSubarea_3[yr]	SEISMO	366	
DegradationTimeRocktypeTwoSubarea_4[yr]	SEISMO	367	
DegradationTimeRocktypeTwoSubarea_5[yr]	SEISMO	368	
DegradationTimeRocktypeTwoSubarea_6[yr]	SEISMO	369	

DegradationTimeRocktypeTwoSubarea_7[yr]	SEISMO	370	
DegradationTimeRocktypeTwoSubarea_8[yr]	SEISMO	371	
DegradationTimeRocktypeTwoSubarea_9[yr]	SEISMO	372	
DeltaPotentialDueToRadiolysis[V]	EBSFAIL	274	
DensityInnerOverpack[kg/m^3]	EBSFAIL	271	
DensityOfAirAtSTP[g/cm3]	ASHPLUMO	1228	
DensityOfDistalAsh[g/m3]	ASHREMOB	1336	
DensityOfWaterAtBoiling[kg/m^3]	NFENV	153	
DensityOuterOverpack[kg/m^3]	EBSFAIL	270	
DepthOfResuspendableLayer[cm]	DCAGS	1310	
DepthOfSurfaceSoil[cm]	GENTPA	1057	
DepthOfTheRootingZone[m]	ASHRMOVO	1256	
DiameterOfVolcanicCone	VOLCANO	1223	
DiffusionCorrectionFactor_C[]	Diffusion	608	
DiffusionCorrectionFactor_I[]	Diffusion	605	
DiffusionCorrectionFactor_U[]	Diffusion	597	
DiffusionCorrectionFactorAm[]	Diffusion	598	
DiffusionCorrectionFactorCl[]	Diffusion	611	
DiffusionCorrectionFactorCm[]	Diffusion	596	
DiffusionCorrectionFactorCs[]	Diffusion	604	
DiffusionCorrectionFactorNb	Diffusion	610	
DiffusionCorrectionFactorNi[]	Diffusion	607	
DiffusionCorrectionFactorNp[]	Diffusion	599	
DiffusionCorrectionFactorPb[]	Diffusion	603	
DiffusionCorrectionFactorPu[]	Diffusion	600	
DiffusionCorrectionFactorRa[]	Diffusion	602	
DiffusionCorrectionFactorSe[]	Diffusion	609	
DiffusionCorrectionFactorTc[]	Diffusion	606	
DiffusionCorrectionFactorTh[]	Diffusion	601	
DiffusionRate_STFF	SZFT	1034	
DirectReleaseOnlyFlag(yes=1,no=0)	Sampling	45	
DispersionFraction_SAV	SZFT	982	
DispersionFraction_STFF	SZFT	981	
DistanceToReceptorGroup[km]	DCAGW	1041	
DistanceToTuffAlluviumInterface[km]	SZFT	1035	
DriftDegradationScenarioFlag(yes=1,no=0)	Disruptive Scenarios	37	
DrinkingWaterConsumptionRate1[L/yr]	GENTPA	1101	
DrinkingWaterConsumptionRate2[L/yr]	GENTPA	1113	
DrinkingWaterConsumptionRate3[L/yr]	GENTPA	1125	
DrinkingWaterConsumptionRate4[L/yr]	GENTPA	1137	
DrinkingWaterConsumptionRate5[L/yr]	GENTPA	1149	
DrinkingWaterConsumptionRate6[L/yr]	GENTPA	1161	
DripShieldBucklingLoadSubarea_1[kg/m]	SEISMO	414	
DripShieldBucklingLoadSubarea_10[kg/m]	SEISMO	423	
DripShieldBucklingLoadSubarea_2[kg/m]	SEISMO	415	
DripShieldBucklingLoadSubarea_3[kg/m]	SEISMO	416	
DripShieldBucklingLoadSubarea_4kg/m]	SEISMO	417	
DripShieldBucklingLoadSubarea_5[kg/m]	SEISMO	418	
DripShieldBucklingLoadSubarea_6[kg/m]	SEISMO	419	
DripShieldBucklingLoadSubarea_7[kg/m]	SEISMO	420	
DripShieldBucklingLoadSubarea_8[kg/m]	SEISMO	421	
DripShieldBucklingLoadSubarea_9[kg/m]	SEISMO	422	
DripShieldBulkHeadCreepCoefficient[]	SEISMO	295	
DripShieldBulkHeadCreepExponent[]	SEISMO	297	
DripShieldBulkHeadCreepFactor[]	SEISMO	291	
DripShieldBulkHeadFailureLogStrain[]	SEISMO	299	
DripShieldBulkHeadYieldStress[MPa]	SEISMO	293	
DripShieldCorrosionRate[m/yr]	DSFAIL	181	

DripShieldCrownRadius[m]	SEISMO	289	
DripShieldEqvIntDia[m]	NFENV	134	
DripShieldHeight[m]	SEISMO	285	
DripShieldPlateCreepCoefficient[]	SEISMO	294	
DripShieldPlateCreepExponent[]	SEISMO	296	
DripShieldPlateCreepFactor[]	SEISMO	290	
DripShieldPlateFailureLogStrain[]	SEISMO	298	
DripShieldPlateYieldStress[MPa]	SEISMO	292	
DripShieldThickness[m]	NFENV	133	
DripShieldTimeMark[yr]	EBSFAIL	187	
DripShieldToWastePackageClearance[m]	SEISMO	288	
DripShieldWidth[m]	SEISMO	286	
DryOxidationConstant	EBSFAIL	230	
DurationOfCompliancePeriod[yr]	Simulation Times	53	
EffectiveThermalConductivityOfBasket&SFinWP[W/(m- C)]	NFENV	177	
EggConsumptionRate1[kg/yr]	GENTPA	1109	
EggConsumptionRate2[kg/yr]	GENTPA	1121	
EggConsumptionRate3[kg/yr]	GENTPA	1133	
EggConsumptionRate4[kg/yr]	GENTPA	1145	
EggConsumptionRate5[kg/yr]	GENTPA	1157	
EggConsumptionRate6[kg/yr]	GENTPA	1169	
ElevationOfGroundSurface[m]	NFENV	179	
ElevationOfRepositoryHorizon[m]	NFENV	178	
EmissivityOfBackfill[-]	NFENV	167	
EmissivityOfDriftWall[-]	NFENV	164	
EmissivityOfDripShield[-]	NFENV	165	
EmissivityOfWastePackage[-]	NFENV	166	
EmplacementBackfillThickness[m]	NFENV	132	
EmplacementDriftDiameter[m]	NFENV	130	
EmplacementDriftSpacing[m]	NFENV	146	
EnthalpyOfPhaseChangeForWater[J/kg]	NFENV	154	
EnvironmentI_Cl[mol/L]	NFENV	96	
EnvironmentI_CO3[mol/L]	NFENV	99	
EnvironmentI_Fl[mol/L]	NFENV	95	
EnvironmentI_NO3[mol/L]	NFENV	98	
EnvironmentI_pH[]	NFENV	97	
EnvironmentI_SO4[mol/L]	NFENV	100	
EnvironmentI_Wastepackage_DeltaECrit[VSHE]	NFENV	101	
EnvironmentII_Cl[mol/L]	NFENV	103	
EnvironmentII_CO3[mol/L]	NFENV	106	
EnvironmentII_Fl[mol/L]	NFENV	102	
EnvironmentII_NO3[mol/L]	NFENV	105	
EnvironmentII_pH[]	NFENV	104	
EnvironmentII_SO4[mol/L]	NFENV	107	
EnvironmentII_Wastepackage_DeltaECrit[VSHE]	NFENV	108	
EnvironmentIII_Cl[mol/L]	NFENV	110	
EnvironmentIII_CO3[mol/L]	NFENV	113	
EnvironmentIII_Fl[mol/L]	NFENV	109	
EnvironmentIII_NO3[mol/L]	NFENV	112	
EnvironmentIII_pH[]	NFENV	111	
EnvironmentIII_SO4[mol/L]	NFENV	114	
EnvironmentIII_Wastepackage_DeltaECrit[VSHE]	NFENV	115	
EquivalentMTUPayloadOfGlassPackage[MTU]	NFENV	157	
EquivalentWeightInnerOverpack[kg/mol]	EBSFAIL	273	
EquivalentWeightOuterOverpack[kg/mol]	EBSFAIL	272	
ErpInterceptWeld[mVSHE]	EBSFAIL	222	
ErpSlopeWeld[mVSHE]	EBSFAIL	224	
ExponentForLocCorrOfInnerOverpack	EBSFAIL	255	

ExponentForLocCorrOfOuterOverpack	EBSFAIL	253	
FactorForDefiningChoiceOfCritPotential	EBSFAIL	258	
FactorForVentilationHeatlosses[]	NFENV	170	
FaultingDisruptiveScenarioFlag(yes=1,no=0)	Disruptive Scenarios	35	
FlagSeepageThreshold[]	NFENV	119	
FlowOnsetTemperature[C]	EBSREL	445	
FractionalCouplingStrength	EBSFAIL	257	
FractionAllowedToDegrade[]	NFENV	83	
FractionOfCondensateRemoved[1/yr]	NFENV	150	
FractionOfCondensateTowardRepository[1/yr]	NFENV	151	
FractionOfCondensateTowardRepositoryRemoved[1/yr]	NFENV	152	
FractionOfIrrigationLostToEvapotranspiration	ASHRMOVO	1251	
FractionOfPrecipitationLostToEvapotranspiration	ASHRMOVO	1250	
FractionOfRepositoryWasteInGlassForm[]	NFENV	149	
FractionOfTimeVolcanicEventIsExtrusive	VOLCANO	1219	
FractionOfWPsWithDiffusionTilt[]	Diffusion	595	
FractionOfYearSoilIsSaturatedDueToIrrigation	ASHRMOVO	1253	
FractionOfYearSoilIsSaturatedDueToPrecipitation	ASHRMOVO	1252	
FractionPlumeCaptureGroundwaterProtection	Groundwater Protection	68	
FractionRockTypeOneInSubarea_1[]	SEISMO	324	
FractionRockTypeOneInSubarea_10[]	SEISMO	333	
FractionRockTypeOneInSubarea_2[]	SEISMO	325	
FractionRockTypeOneInSubarea_3[]	SEISMO	326	
FractionRockTypeOneInSubarea_4[]	SEISMO	327	
FractionRockTypeOneInSubarea_5[]	SEISMO	328	
FractionRockTypeOneInSubarea_6[]	SEISMO	329	
FractionRockTypeOneInSubarea_7[]	SEISMO	330	
FractionRockTypeOneInSubarea_8[]	SEISMO	331	
FractionRockTypeOneInSubarea_9[]	SEISMO	332	
FractureAperture_BFw_[m]	UZFT	854	
FractureAperture_CHnv[m]	UZFT	855	
FractureAperture_CHnz[m]	UZFT	856	
FractureAperture_PPw_[m]	UZFT	857	
FractureAperture_STFF[m]	SZFT	1014	
FractureAperture_TSw_[m]	UZFT	858	
FractureAperture_UCF_[m]	UZFT	859	
FractureAperture_UFZ_[m]	UZFT	860	
FractureBeta_BFw_	UZFT	852	
FractureBeta_CHnv	UZFT	848	
FractureBeta_CHnz	UZFT	849	
FractureBeta_PPw_	UZFT	850	
FractureBeta_TSw_	UZFT	847	
FractureBeta_UCF_	UZFT	851	
FractureBeta_UFZ_	UZFT	853	
FractureColloidConcentration_BFw_[kg/m3]	UZFT	887	
FractureColloidConcentration_CHnv[kg/m3]	UZFT	883	
FractureColloidConcentration_Chnz[kg/m3]	UZFT	884	
FractureColloidConcentration_PPw_[kg/m3]	UZFT	885	
FractureColloidConcentration_TSw_[kg/m3]	UZFT	882	
FractureColloidConcentration_UCF_[kg/m3]	UZFT	886	
FractureColloidConcentration_UFZ_[kg/m3]	UZFT	888	
FractureColloidRetardationFactor_BFw_[m3/kg]	UZFT	873	
FractureColloidRetardationFactor_CHnv[m3/kg]	UZFT	869	
FractureColloidRetardationFactor_CHnz[m3/kg]	UZFT	870	
FractureColloidRetardationFactor_PPw_[m3/kg]	UZFT	871	
FractureColloidRetardationFactor_TSw_[m3/kg]	UZFT	868	
FractureColloidRetardationFactor_UCF_[m3/kg]	UZFT	872	
FractureColloidRetardationFactor_UFZ_[m3/kg]	UZFT	874	

FractureLongitudinalDispersivity[FractionOfLayer]	UZFT	633	
FracturePermeability_BFw_[m2]	UZFT	838	
FracturePermeability_CHnv[m2]	UZFT	834	
FracturePermeability_CHnz[m2]	UZFT	835	
FracturePermeability_PPw_[m2]	UZFT	836	
FracturePermeability_TSw_[m2]	UZFT	833	
FracturePermeability_UCF_[m2]	UZFT	837	
FracturePermeability_UFZ_[m2]	UZFT	839	
FracturePorosity_BFw_	UZFT	845	
FracturePorosity_CHnv	UZFT	841	
FracturePorosity_CHnz	UZFT	842	
FracturePorosity_PPw_	UZFT	843	
FracturePorosity_STFF	SZFT	1013	
FracturePorosity_TSw_	UZFT	840	
FracturePorosity_UCF_	UZFT	844	
FracturePorosity_UFZ_	UZFT	846	
FractureRD_BFw_C	UZFT	782	
FractureRD_BFw_Cl	UZFT	740	
FractureRD_BFw_Cm	UZFT	747	
FractureRD_BFw_Cs	UZFT	768	
FractureRD_BFw_I	UZFT	726	
FractureRD_BFw_Nb	UZFT	796	
FractureRD_BFw_Ni	UZFT	775	
FractureRD_BFw_Pb	UZFT	761	
FractureRD_BFw_Ra	UZFT	754	
FractureRD_BFw_Se	UZFT	789	
FractureRD_BFw_Tc	UZFT	733	
FractureRD_CHnvC	UZFT	778	
FractureRD_CHnvCl	UZFT	736	
FractureRD_CHnvCm	UZFT	743	
FractureRD_CHnvCs	UZFT	764	
FractureRD_CHnvI	UZFT	722	
FractureRD_CHnvNb	UZFT	792	
FractureRD_CHnvNi	UZFT	771	
FractureRD_CHnvPb	UZFT	757	
FractureRD_CHnvRa	UZFT	750	
FractureRD_CHnvSe	UZFT	785	
FractureRD_CHnvTc	UZFT	729	
FractureRD_CHnzC	UZFT	779	
FractureRD_CHnzCl	UZFT	737	
FractureRD_CHnzCm	UZFT	744	
FractureRD_CHnzCs	UZFT	765	
FractureRD_CHnzI	UZFT	723	
FractureRD_CHnzNb	UZFT	793	
FractureRD_CHnzNi	UZFT	772	
FractureRD_CHnzPb	UZFT	758	
FractureRD_CHnzRa	UZFT	751	
FractureRD_CHnzSe	UZFT	786	
FractureRD_CHnzTc	UZFT	730	
FractureRD_PPw_C	UZFT	780	
FractureRD_PPw_Cl	UZFT	738	
FractureRD_PPw_Cm	UZFT	745	
FractureRD_PPw_Cs	UZFT	766	
FractureRD_PPw_I	UZFT	724	
FractureRD_PPw_Nb	UZFT	794	
FractureRD_PPw_Ni	UZFT	773	
FractureRD_PPw_Pb	UZFT	759	
FractureRD_PPw_Ra	UZFT	752	

FractureRD_PPw_Se	UZFT	787	
FractureRD_PPw_Tc	UZFT	731	
FractureRD_STFF_C	SZFT	1001	
FractureRD_STFF_Cl	SZFT	989	
FractureRD_STFF_Cm	SZFT	991	
FractureRD_STFF_Cs	SZFT	997	
FractureRD_STFF_I	SZFT	985	
FractureRD_STFF_Nb	SZFT	1005	
FractureRD_STFF_Ni	SZFT	999	
FractureRD_STFF_Pb	SZFT	995	
FractureRD_STFF_Ra	SZFT	993	
FractureRD_STFF_Se	SZFT	1003	
FractureRD_STFF_Tc	SZFT	987	
FractureRD_TSw_C	UZFT	777	
FractureRD_TSw_Cl	UZFT	735	
FractureRD_TSw_Cm	UZFT	742	
FractureRD_TSw_Cs	UZFT	763	
FractureRD_TSw_I	UZFT	721	
FractureRD_TSw_Nb	UZFT	791	
FractureRD_TSw_Ni	UZFT	770	
FractureRD_TSw_Pb	UZFT	756	
FractureRD_TSw_Ra	UZFT	749	
FractureRD_TSw_Se	UZFT	784	
FractureRD_TSw_Tc	UZFT	728	
FractureRD_UCF_C	UZFT	781	
FractureRD_UCF_Cl	UZFT	739	
FractureRD_UCF_Cm	UZFT	746	
FractureRD_UCF_Cs	UZFT	767	
FractureRD_UCF_I	UZFT	725	
FractureRD_UCF_Nb	UZFT	795	
FractureRD_UCF_Ni	UZFT	774	
FractureRD_UCF_Pb	UZFT	760	
FractureRD_UCF_Ra	UZFT	753	
FractureRD_UCF_Se	UZFT	788	
FractureRD_UCF_Tc	UZFT	732	
FractureRD_UFZ_C	UZFT	783	
FractureRD_UFZ_Cl	UZFT	741	
FractureRD_UFZ_Cm	UZFT	748	
FractureRD_UFZ_Cs	UZFT	769	
FractureRD_UFZ_I	UZFT	727	
FractureRD_UFZ_Nb	UZFT	797	
FractureRD_UFZ_Ni	UZFT	776	
FractureRD_UFZ_Pb	UZFT	762	
FractureRD_UFZ_Ra	UZFT	755	
FractureRD_UFZ_Se	UZFT	790	
FractureRD_UFZ_Tc	UZFT	734	
FracturesPerMeter_STFF[1/m]	SZFT	979	
FractureToughness[MPa-m**0.5]	EBSFAIL	269	
FruitConsumptionRate1[kg/yr]	GENTPA	1104	
FruitConsumptionRate2[kg/yr]	GENTPA	1116	
FruitConsumptionRate3[kg/yr]	GENTPA	1128	
FruitConsumptionRate4[kg/yr]	GENTPA	1140	
FruitConsumptionRate5[kg/yr]	GENTPA	1152	
FruitConsumptionRate6[kg/yr]	GENTPA	1164	
FruitIrrigationRateCB[in/yr]	GENTPA	1075	
FruitIrrigationRatePB[in/yr]	GENTPA	1061	
FruitIrrigationTimeCB[mo/yr]	GENTPA	1082	
FruitIrrigationTimePB[mo/yr]	GENTPA	1068	

FuelRadiusInRod[m]	Cladding	578	
FuelRodHalfLength[m]	Cladding	577	
GapAndGrainBoundaryInventoryPerKgSF[ci]	EBSREL	496	
GapFractionForAM241	EBSREL	471	
GapFractionForAM243	EBSREL	473	
GapFractionForC14	EBSREL	485	
GapFractionForCL36	EBSREL	484	
GapFractionForCM245	EBSREL	470	
GapFractionForCM246	EBSREL	468	
GapFractionForCS135	EBSREL	480	
GapFractionForI129	EBSREL	481	
GapFractionForNB94	EBSREL	487	
GapFractionForNI59	EBSREL	483	
GapFractionForNP237	EBSREL	472	
GapFractionForPB210	EBSREL	479	
GapFractionForPU239	EBSREL	474	
GapFractionForPU240	EBSREL	475	
GapFractionForRA226	EBSREL	478	
GapFractionForSE79	EBSREL	486	
GapFractionForTC99	EBSREL	482	
GapFractionForTH230	EBSREL	477	
GapFractionForU234	EBSREL	476	
GapFractionForU238	EBSREL	469	
GenerateRestartFiles(yes=1,no=0)	Globals	2	
GlassActivationEnergyHighRange[kJ/mol-K]	Glass	584	
GlassActivationEnergyLowRange[kJ/mol-K]	Glass	587	
GrainBoundaryThickness[micrometer]	EBSFAIL	229	
GrainConsumptionRate1[kg/yr]	GENTPA	1105	
GrainConsumptionRate2[kg/yr]	GENTPA	1117	
GrainConsumptionRate3[kg/yr]	GENTPA	1129	
GrainConsumptionRate4[kg/yr]	GENTPA	1141	
GrainConsumptionRate5[kg/yr]	GENTPA	1153	
GrainConsumptionRate6[kg/yr]	GENTPA	1165	
GrainIrrigationRateCB[in/yr]	GENTPA	1076	
GrainIrrigationRatePB[in/yr]	GENTPA	1062	
GrainIrrigationTimeCB[mo/yr]	GENTPA	1083	
GrainIrrigationTimePB[mo/yr]	GENTPA	1069	
GroundAccelerationInitialRockTypeOneSubarea_1[pga]	SEISMO	374	
GroundAccelerationInitialRockTypeOneSubarea_10[pga]	SEISMO	383	
GroundAccelerationInitialRockTypeOneSubarea_2[pga]	SEISMO	375	
GroundAccelerationInitialRockTypeOneSubarea_3[pga]	SEISMO	376	
GroundAccelerationInitialRockTypeOneSubarea_4[pga]	SEISMO	377	
GroundAccelerationInitialRockTypeOneSubarea_5[pga]	SEISMO	378	
GroundAccelerationInitialRockTypeOneSubarea_6[pga]	SEISMO	379	
GroundAccelerationInitialRockTypeOneSubarea_7[pga]	SEISMO	380	
GroundAccelerationInitialRockTypeOneSubarea_8[pga]	SEISMO	381	
GroundAccelerationInitialRockTypeOneSubarea_9[pga]	SEISMO	382	
GroundAccelerationInitialRockTypeTwoSubarea_1[pga]	SEISMO	384	
GroundAccelerationInitialRockTypeTwoSubarea_10[pga]	SEISMO	393	
GroundAccelerationInitialRockTypeTwoSubarea_2[pga]	SEISMO	385	
GroundAccelerationInitialRockTypeTwoSubarea_3[pga]	SEISMO	386	
GroundAccelerationInitialRockTypeTwoSubarea_4[pga]	SEISMO	387	
GroundAccelerationInitialRockTypeTwoSubarea_5[pga]	SEISMO	388	
GroundAccelerationInitialRockTypeTwoSubarea_6[pga]	SEISMO	389	
GroundAccelerationInitialRockTypeTwoSubarea_7[pga]	SEISMO	390	
GroundAccelerationInitialRockTypeTwoSubarea_8[pga]	SEISMO	391	
GroundAccelerationInitialRockTypeTwoSubarea_9[pga]	SEISMO	392	
GroundAccelerationMaximumRockTypeOneSubarea_1[pga]	SEISMO	394	

GroundAccelerationMaximumRockTypeOneSubarea_10[pga]	SEISMO	403	
GroundAccelerationMaximumRockTypeOneSubarea_2[pga]	SEISMO	395	
GroundAccelerationMaximumRockTypeOneSubarea_3[pga]	SEISMO	396	
GroundAccelerationMaximumRockTypeOneSubarea_4[pga]	SEISMO	397	
GroundAccelerationMaximumRockTypeOneSubarea_5[pga]	SEISMO	398	
GroundAccelerationMaximumRockTypeOneSubarea_6[pga]	SEISMO	399	
GroundAccelerationMaximumRockTypeOneSubarea_7[pga]	SEISMO	400	
GroundAccelerationMaximumRockTypeOneSubarea_8[pga]	SEISMO	401	
GroundAccelerationMaximumRockTypeOneSubarea_9[pga]	SEISMO	402	
GroundAccelerationMaximumRockTypeTwoSubarea_1[pga]	SEISMO	404	
GroundAccelerationMaximumRockTypeTwoSubarea_10[pga]	SEISMO	413	
GroundAccelerationMaximumRockTypeTwoSubarea_2[pga]	SEISMO	405	
GroundAccelerationMaximumRockTypeTwoSubarea_3[pga]	SEISMO	406	
GroundAccelerationMaximumRockTypeTwoSubarea_4[pga]	SEISMO	407	
GroundAccelerationMaximumRockTypeTwoSubarea_5[pga]	SEISMO	408	
GroundAccelerationMaximumRockTypeTwoSubarea_6[pga]	SEISMO	409	
GroundAccelerationMaximumRockTypeTwoSubarea_7[pga]	SEISMO	410	
GroundAccelerationMaximumRockTypeTwoSubarea_8[pga]	SEISMO	411	
GroundAccelerationMaximumRockTypeTwoSubarea_9[pga]	SEISMO	412	
GroundSurfaceTemperature[C]	NFENV	160	
GroundwaterProtectionCalc(yes=1,no=0)	Groundwater Protection	66	
HenFeedGrowTime[day]	GENTPA	1088	
HenFeedIrrigationRateCB[in/yr]	GENTPA	1079	
HenFeedIrrigationRatePB[in/yr]	GENTPA	1065	
HenFeedIrrigationTimeCB[mo/yr]	GENTPA	1086	
HenFeedIrrigationTimePB[mo/yr]	GENTPA	1072	
HomeIrrigationRateCB[in/yr]	GENTPA	1077	
HomeIrrigationRatePB[in/yr]	GENTPA	1063	
HomeIrrigationTimeCB[mo/yr]	GENTPA	1084	
HomeIrrigationTimePB[mo/yr]	GENTPA	1070	
HumidAirCorrosionRate[m/yr]	EBSFAIL	256	
ImmobileGrainDensity_STFF[kg/m3]	SZFT	1031	
ImmobilePoreRadius_STFF[m]	SZFT	1033	
ImmobilePorosity_STFF	SZFT	1032	
ImmobilePorosityPenetrationFraction_STFF	SZFT	978	
ImmobileRd_STFF_C	SZFT	1028	
ImmobileRd_STFF_Cl	SZFT	1022	
ImmobileRd_STFF_Cm	SZFT	1023	
ImmobileRd_STFF_Cs	SZFT	1026	
ImmobileRd_STFF_I	SZFT	1020	
ImmobileRd_STFF_Nb	SZFT	1030	
ImmobileRd_STFF_Ni	SZFT	1027	
ImmobileRd_STFF_Pb	SZFT	1025	
ImmobileRd_STFF_Ra	SZFT	1024	
ImmobileRd_STFF_Se	SZFT	1029	
ImmobileRd_STFF_Tc	SZFT	1021	
IModel	EBSREL	447	
ImportanceAnalysisFlag(yes=1,no=0)	Importance Analysis	4	
IncorporationRatio	ASHPLUMO	1240	
IndoorShieldingFactor	DCAGS	1313	
InhalationExposureTime1[hr]	GENTPA	1110	
InhalationExposureTime2[hr]	GENTPA	1122	
InhalationExposureTime3[hr]	GENTPA	1134	
InhalationExposureTime4[hr]	GENTPA	1146	
InhalationExposureTime5[hr]	GENTPA	1158	
InhalationExposureTime6[hr]	GENTPA	1170	
InhalationRate1[cm3/s]	GENTPA	1111	
InhalationRate2[cm3/s]	GENTPA	1123	

InhalationRate3[cm3/s]	GENTPA	1135	
InhalationRate4[cm3/s]	GENTPA	1147	
InhalationRate5[cm3/s]	GENTPA	1159	
InhalationRate6[cm3/s]	GENTPA	1171	
InitialFailureTime[yr]	EBSREL	437	
InitialRadiusOfSFParticles[m]	EBSREL	488	
InletArea__1SubArea[m2]	UZFT	896	
InletArea__2SubArea[m2]	UZFT	897	
InletArea__3SubArea[m2]	UZFT	898	
InletArea__4SubArea[m2]	UZFT	899	
InletArea__5SubArea[m2]	UZFT	900	
InletArea__6SubArea[m2]	UZFT	901	
InletArea__7SubArea[m2]	UZFT	902	
InletArea__8SubArea[m2]	UZFT	903	
InletArea__9SubArea[m2]	UZFT	904	
InletArea_10SubArea[m2]	UZFT	905	
InnerActivationEnergyPassiveCurrDens[J/mol]	EBSFAIL	207	
InnerActivationEnergyReductionReactHighpH[J/mole]	EBSFAIL	202	
InnerActivationEnergyReductionReactLowpH[J/mole]	EBSFAIL	203	
InnerChargeTransferCoefReductionReactHighpH	EBSFAIL	198	
InnerChargeTransferCoefReductionReactLowpH	EBSFAIL	199	
InnerDeltaEcritInh[mV]	EBSFAIL	216	
InnerEffectiveReactionOrderHHighpH	EBSFAIL	204	
InnerEffectiveReactionOrderHLowpH	EBSFAIL	205	
InnerInhibitingCarbonateToCl	EBSFAIL	214	
InnerInhibitingNitrateToCl	EBSFAIL	213	
InnerInhibitingSulfateToCl	EBSFAIL	215	
InnerOverpackErpIntercept	EBSFAIL	239	
InnerOverpackErpSlope	EBSFAIL	241	
InnerReferenceCurrReductionReactHighpH[C/(m2*yr)]	EBSFAIL	200	
InnerReferenceCurrReductionReactLowpH[C/(m2*yr)]	EBSFAIL	201	
InnerWPActivationEnergyforWaterReduction[J/mole]	EBSFAIL	248	
InnerWPBetaKineticsParameterforWater	EBSFAIL	244	
InnerWPRateConstantforWaterReduction[coulomb-m/m^2/yr]	EBSFAIL	247	
InnerWPThickness[m]	EBSFAIL	227	
InterceptionFraction/Irrigate	GENTPA	1056	
InternalFilmCrossSectionalArea[m^2]	Diffusion	593	
InvertBypass(0=ebsfilt,1=bypass-ebsfilt)	EBSFILT	624	
InvertDiffusionCoefficient[m^2/yr]	EBSFILT	627	
InvertHeight[m]	SEISMO	287	
InvertMatrixPermeability[m^2]	EBSFILT	628	
InvertRockPorosity	EBSFILT	625	
InvertThickness[m]	EBSFILT	626	
IrreversibleColloidModel[0=no,1=yes]	EBSFILT	629	
KD_Soil_Am[cm3/g]	GENTPA	1178	
KD_Soil_C[cm3/g]	GENTPA	1188	
KD_Soil_Cl[cm3/g]	GENTPA	1187	
KD_Soil_Cm[cm3/g]	GENTPA	1175	
KD_Soil_Cs[cm3/g]	GENTPA	1183	
KD_Soil_I[cm3/g]	GENTPA	1184	
KD_Soil_Nb[cm3/g]	GENTPA	1190	
KD_Soil_Ni[cm3/g]	GENTPA	1186	
KD_Soil_Np[cm3/g]	GENTPA	1179	
KD_Soil_Pb[cm3/g]	GENTPA	1182	
KD_Soil_Pu[cm3/g]	GENTPA	1176	
KD_Soil_Ra[cm3/g]	GENTPA	1181	
KD_Soil_Se[cm3/g]	GENTPA	1189	
KD_Soil_Tc[cm3/g]	GENTPA	1185	

KD_Soil_Th[cm3/g]	GENTPA	1180	
KD_Soil_U[cm3/g]	GENTPA	1177	
KdOfActiniumInVolcanicAsh[cm3/g]	ASHRMOVO	1265	
KdOfAmericiumInVolcanicAsh[cm3/g]	ASHRMOVO	1260	
KdOfCarbonInVolcanicAsh[cm3/g]	ASHRMOVO	1281	
KdOfCesiumInVolcanicAsh[cm3/g]	ASHRMOVO	1268	
KdOfChlorineInVolcanicAsh[cm3/g]	ASHRMOVO	1280	
KdOfCuriumInVolcanicAsh[cm3/g]	ASHRMOVO	1258	
KdOfIodineInVolcanicAsh[cm3/g]	ASHRMOVO	1269	
KdOfLeadInVolcanicAsh[cm3/g]	ASHRMOVO	1263	
KdOfMolybdenumInVolcanicAsh[cm3/g]	ASHRMOVO	1274	
KdOfNeptuniumInVolcanicAsh[cm3/g]	ASHRMOVO	1266	
KdOfNickelInVolcanicAsh[cm3/g]	ASHRMOVO	1279	
KdOfNiobiumInVolcanicAsh[cm3/g]	ASHRMOVO	1275	
KdOfPaladiumInVolcanicAsh[cm3/g]	ASHRMOVO	1272	
KdOfPlutoniumInVolcanicAsh[cm3/g]	ASHRMOVO	1259	
KdOfProtactiniumInVolcanicAsh[cm3/g]	ASHRMOVO	1264	
KdOfRadiumInVolcanicAsh[cm3/g]	ASHRMOVO	1262	
KdOfSamariumInVolcanicAsh[cm3/g]	ASHRMOVO	1267	
KdOfSeleniumInVolcanicAsh[cm3/g]	ASHRMOVO	1278	
KdOfSilverInVolcanicAsh[cm3/g]	ASHRMOVO	1271	
KdOfStrontiumInVolcanicAsh[cm3/g]	ASHRMOVO	1277	
KdOfTechnetiumInVolcanicAsh[cm3/g]	ASHRMOVO	1273	
KdOfThoriumInVolcanicAsh[cm3/g]	ASHRMOVO	1261	
KdOfTinInVolcanicAsh[cm3/g]	ASHRMOVO	1270	
KdOfUraniumInVolcanicAsh[cm3/g]	ASHRMOVO	1257	
KdOfZirconiumInVolcanicAsh[cm3/g]	ASHRMOVO	1276	
KinematicViscosity[m^2/s]	NFENV	85	
LatinHypercubeSampling(yes=1,no=0)	Sampling	47	
LeafyVegetableConsumptionRate1[kg/yr]	GENTPA	1102	
LeafyVegetableConsumptionRate2[kg/yr]	GENTPA	1114	
LeafyVegetableConsumptionRate3[kg/yr]	GENTPA	1126	
LeafyVegetableConsumptionRate4[kg/yr]	GENTPA	1138	
LeafyVegetableConsumptionRate5[kg/yr]	GENTPA	1150	
LeafyVegetableConsumptionRate6[kg/yr]	GENTPA	1162	
LeafyVegetableIrrigationRateCB[in/yr]	GENTPA	1073	
LeafyVegetableIrrigationRatePB[in/yr]	GENTPA	1059	
LeafyVegetableIrrigationTimeCB[mo/yr]	GENTPA	1080	
LeafyVegetableIrrigationTimePB[mo/yr]	GENTPA	1066	
LengthOfFilmPathInsideWP[m]	Diffusion	592	
LengthOfRefluxZone[m]	NFENV	136	
LengthOfVolcanicDike[m]	VOLCANO	1221	
LogCO2PartialPressure_AllUZ_SZLayers[atm]	UZFT	635	
LogOfGlassDissolutionConstantHighRange[]	Glass	582	
LogOfGlassDissolutionConstantLowRange[]	Glass	585	
MassDensityofYMRock[kg/m^3]	NFENV	161	
MatrixBeta_BFw_	UZFT	817	
MatrixBeta_CHnv	UZFT	813	
MatrixBeta_CHnz	UZFT	814	
MatrixBeta_PPw_	UZFT	815	
MatrixBeta_TSw_	UZFT	812	
MatrixBeta_UCF_	UZFT	816	
MatrixBeta_UFZ_	UZFT	818	
MatrixColloidConcentration_BFw_[kg/m3]	UZFT	894	
MatrixColloidConcentration_CHnv[kg/m3]	UZFT	890	
MatrixColloidConcentration_Chnz[kg/m3]	UZFT	891	
MatrixColloidConcentration_PPw_[kg/m3]	UZFT	892	
MatrixColloidConcentration_TSw_[kg/m3]	UZFT	889	

MatrixColloidConcentration_UCF_[kg/m3]	UZFT	893	
MatrixColloidConcentration_UFZ_[kg/m3]	UZFT	895	
MatrixColloidRetardationFactor_BFw_[m3/kg]	UZFT	880	
MatrixColloidRetardationFactor_CHnv[m3/kg]	UZFT	876	
MatrixColloidRetardationFactor_CHnz[m3/kg]	UZFT	877	
MatrixColloidRetardationFactor_PPw_[m3/kg]	UZFT	878	
MatrixColloidRetardationFactor_TSw_[m3/kg]	UZFT	875	
MatrixColloidRetardationFactor_UCF_[m3/kg]	UZFT	879	
MatrixColloidRetardationFactor_UFZ_[m3/kg]	UZFT	881	
MatrixGrainDensity_BFw_[kg/m3]	UZFT	824	
MatrixGrainDensity_CHnv[kg/m3]	UZFT	820	
MatrixGrainDensity_CHnz[kg/m3]	UZFT	821	
MatrixGrainDensity_PPw_[kg/m3]	UZFT	822	
MatrixGrainDensity_TSw_[kg/m3]	UZFT	819	
MatrixGrainDensity_UCF_[kg/m3]	UZFT	823	
MatrixGrainDensity_UFZ_[kg/m3]	UZFT	825	
MatrixKD_BFw_C[m3/kg]	UZFT	698	
MatrixKD_BFw_Cl[m3/kg]	UZFT	656	
MatrixKD_BFw_Cm[m3/kg]	UZFT	663	
MatrixKD_BFw_Cs[m3/kg]	UZFT	684	
MatrixKD_BFw_I[m3/kg]	UZFT	642	
MatrixKD_BFw_Nb[m3/kg]	UZFT	712	
MatrixKD_BFw_Ni[m3/kg]	UZFT	691	
MatrixKD_BFw_Pb[m3/kg]	UZFT	677	
MatrixKD_BFw_Ra[m3/kg]	UZFT	670	
MatrixKD_BFw_Se[m3/kg]	UZFT	705	
MatrixKD_BFw_Tc[m3/kg]	UZFT	649	
MatrixKD_CHnvC[m3/kg]	UZFT	694	
MatrixKD_CHnvCl[m3/kg]	UZFT	652	
MatrixKD_CHnvCm[m3/kg]	UZFT	659	
MatrixKD_CHnvCs[m3/kg]	UZFT	680	
MatrixKD_CHnvI[m3/kg]	UZFT	638	
MatrixKD_CHnvNb[m3/kg]	UZFT	708	
MatrixKD_CHnvNi[m3/kg]	UZFT	687	
MatrixKD_CHnvPb[m3/kg]	UZFT	673	
MatrixKD_CHnvRa[m3/kg]	UZFT	666	
MatrixKD_CHnvSe[m3/kg]	UZFT	701	
MatrixKD_CHnvTc[m3/kg]	UZFT	645	
MatrixKD_CHnzC[m3/kg]	UZFT	695	
MatrixKD_CHnzCl[m3/kg]	UZFT	653	
MatrixKD_CHnzCm[m3/kg]	UZFT	660	
MatrixKD_CHnzCs[m3/kg]	UZFT	681	
MatrixKD_CHnzI[m3/kg]	UZFT	639	
MatrixKD_CHnzNb[m3/kg]	UZFT	709	
MatrixKD_CHnzNi[m3/kg]	UZFT	688	
MatrixKD_CHnzPb[m3/kg]	UZFT	674	
MatrixKD_CHnzRa[m3/kg]	UZFT	667	
MatrixKD_CHnzSe[m3/kg]	UZFT	702	
MatrixKD_CHnzTc[m3/kg]	UZFT	646	
MatrixKD_PPw_C[m3/kg]	UZFT	696	
MatrixKD_PPw_Cl[m3/kg]	UZFT	654	
MatrixKD_PPw_Cm[m3/kg]	UZFT	661	
MatrixKD_PPw_Cs[m3/kg]	UZFT	682	
MatrixKD_PPw_I[m3/kg]	UZFT	640	
MatrixKD_PPw_Nb[m3/kg]	UZFT	710	
MatrixKD_PPw_Ni[m3/kg]	UZFT	689	
MatrixKD_PPw_Pb[m3/kg]	UZFT	675	

MatrixKD_PPw_Ra[m3/kg]	UZFT	668	
MatrixKD_PPw_Se[m3/kg]	UZFT	703	
MatrixKD_PPw_Tc[m3/kg]	UZFT	647	
MatrixKD_TSw_C[m3/kg]	UZFT	693	
MatrixKD_TSw_Cl[m3/kg]	UZFT	651	
MatrixKD_TSw_Cm[m3/kg]	UZFT	658	
MatrixKD_TSw_Cs[m3/kg]	UZFT	679	
MatrixKD_TSw_I[m3/kg]	UZFT	637	
MatrixKD_TSw_Nb[m3/kg]	UZFT	707	
MatrixKD_TSw_Ni[m3/kg]	UZFT	686	
MatrixKD_TSw_Pb[m3/kg]	UZFT	672	
MatrixKD_TSw_Ra[m3/kg]	UZFT	665	
MatrixKD_TSw_Se[m3/kg]	UZFT	700	
MatrixKD_TSw_Tc[m3/kg]	UZFT	644	
MatrixKD_UCF_C[m3/kg]	UZFT	697	
MatrixKD_UCF_Cl[m3/kg]	UZFT	655	
MatrixKD_UCF_Cm[m3/kg]	UZFT	662	
MatrixKD_UCF_Cs[m3/kg]	UZFT	683	
MatrixKD_UCF_I[m3/kg]	UZFT	641	
MatrixKD_UCF_Nb[m3/kg]	UZFT	711	
MatrixKD_UCF_Ni[m3/kg]	UZFT	690	
MatrixKD_UCF_Pb[m3/kg]	UZFT	676	
MatrixKD_UCF_Ra[m3/kg]	UZFT	669	
MatrixKD_UCF_Se[m3/kg]	UZFT	704	
MatrixKD_UCF_Tc[m3/kg]	UZFT	648	
MatrixKD_UFZ_C[m3/kg]	UZFT	699	
MatrixKD_UFZ_Cl[m3/kg]	UZFT	657	
MatrixKD_UFZ_Cm[m3/kg]	UZFT	664	
MatrixKD_UFZ_Cs[m3/kg]	UZFT	685	
MatrixKD_UFZ_I[m3/kg]	UZFT	643	
MatrixKD_UFZ_Nb[m3/kg]	UZFT	713	
MatrixKD_UFZ_Ni[m3/kg]	UZFT	692	
MatrixKD_UFZ_Pb[m3/kg]	UZFT	678	
MatrixKD_UFZ_Ra[m3/kg]	UZFT	671	
MatrixKD_UFZ_Se[m3/kg]	UZFT	706	
MatrixKD_UFZ_Tc[m3/kg]	UZFT	650	
MatrixLongitudinalDispersivity[FractionOfLayer]	UZFT	632	
MatrixPermeability_BFw_[m2]	UZFT	803	
MatrixPermeability_CHnv[m2]	UZFT	799	
MatrixPermeability_CHnz[m2]	UZFT	800	
MatrixPermeability_PPw_[m2]	UZFT	801	
MatrixPermeability_TSw_[m2]	UZFT	798	
MatrixPermeability_UCF_[m2]	UZFT	802	
MatrixPermeability_UFZ_[m2]	UZFT	804	
MatrixPoreRadius_BFw_[m]	UZFT	831	
MatrixPoreRadius_CHnv[m]	UZFT	827	
MatrixPoreRadius_CHnz[m]	UZFT	828	
MatrixPoreRadius_PPw_[m]	UZFT	829	
MatrixPoreRadius_TSw_[m]	UZFT	826	
MatrixPoreRadius_UCF_[m]	UZFT	830	
MatrixPoreRadius_UFZ_[m]	UZFT	832	
MatrixPorosity_BFw_	UZFT	810	
MatrixPorosity_CHnv	UZFT	806	
MatrixPorosity_CHnz	UZFT	807	
MatrixPorosity_PPw_	UZFT	808	
MatrixPorosity_TSw_	UZFT	805	
MatrixPorosity_UCF_	UZFT	809	
MatrixPorosity_UFZ_	UZFT	811	

MaximumAshDensityforVariationWithSize[g/cm3]	ASHPLUMO	1236	
MaximumAshLogdiameterForDensityVariation	ASHPLUMO	1238	
MaximumFluoride[mol/L]	DSFAIL	185	
MaximumFluxInRefluxZone[m/s]	NFENV	137	
MaximumFuelParticulateSize[cm]	ASHPLUMO	1234	
MaximumParticleDiameterForParticleTransport[cm]	ASHPLUMO	1231	
MaximumTime[yr]	Simulation Times	54	
MeanAnnualPrecipitationMultiplierAtGlacialMaximum	UZFLOW	73	
MeanAnnualTemperatureIncreaseAtGlacialMaximum[degC]	UZFLOW	74	
MeasuredGalvanicCouplePotential	EBSFAIL	251	
MetalGrainRadius[micrometer]	EBSFAIL	228	
MilkConsumptionRate1[kg/yr]	GENTPA	1108	
MilkConsumptionRate2[kg/yr]	GENTPA	1120	
MilkConsumptionRate3[kg/yr]	GENTPA	1132	
MilkConsumptionRate4[kg/yr]	GENTPA	1144	
MilkConsumptionRate5[kg/yr]	GENTPA	1156	
MilkConsumptionRate6[kg/yr]	GENTPA	1168	
MilkFreshForageDietFraction	GENTPA	1090	
MilkFreshForageGrowTime[day]	GENTPA	1092	
MilkFreshForageIrrigationRateCB[in/yr]	GENTPA	1098	
MilkFreshForageIrrigationRatePB[in/yr]	GENTPA	1094	
MilkFreshForageIrrigationTimeCB[mo/yr]	GENTPA	1100	
MilkFreshForageIrrigationTimePB[mo/yr]	GENTPA	1096	
MinimumAshDensityforVariationWithSize[g/cm3]	ASHPLUMO	1235	
MinimumAshLogdiameterForDensityVariation	ASHPLUMO	1237	
MinimumFluoride[mol/L]	DSFAIL	184	
MinimumFuelParticulateSize[cm]	ASHPLUMO	1232	
MinimumResidenceTime_SAV[yr]	SZFT	984	
MinimumResidenceTime_STFF[yr]	SZFT	983	
MixingZoneDispersionFraction	SZFT	980	
MixingZoneThickness[m]	DCAGW	1046	
ModeFuelParticulateSize[cm]	ASHPLUMO	1233	
NEAmountOfLargestCredibleDisplacement[m]	FAULTO	1210	
NECumulativeDisplacementRate[mm/yr]	FAULTO	1212	
NEFaultStrikeOrientationMeasuredfromNorthClockwise[degrees]	FAULTO	1204	
NEFaultTraceLength[m]	FAULTO	1206	
NEFaultZoneWidth[m]	FAULTO	1208	
NegativeLog10CarbonateConcentration[mol/L]	EBSREL	449	
NsetLatinHypercubeSampling	Sampling	48	
nsetUsedToPickTempRHDataSet	NFENV	122	
NumberOfBlockSizePoints[]	SEISMO	284	
NumberOfMagmaInducedMechanicalFailuresRemainingInDrift[ ]	VOLCANO	1226	
NumberOfRealizations	Sampling	49	
NumberOfSEISMOWPFailureIntervalues	EBSREL	439	
NumberOfTimeStepsAfterCompliancePeriod	Simulation Times	57	
NumberOfTimeStepsInCompliancePeriod	Simulation Times	55	
NumberOfWeightsForGaussLegendreIntegration[]	NFENV	172	
NumberOfWPsEntrainedByEjecta[ ]	VOLCANO	1225	
NWAmountOfLargestCredibleDisplacement[m]	FAULTO	1209	
NWCumulativeDisplacementRate[mm/yr]	FAULTO	1211	
NWFaultStrikeOrientationMeasuredfromNorthClockwise[degrees]	FAULTO	1203	
NWFaultTraceLength[m]	FAULTO	1205	
NWFaultZoneWidth[m]	FAULTO	1207	
OccupancyFractionInsideHeavyDisturbance[]	DCAGS	1323	
OccupancyFractionInsideLightDisturbance[]	DCAGS	1324	
OccupancyFractionOffsite[]	DCAGS	1325	
OccupancyFractionOutsideHeavyDisturbance[]	DCAGS	1321	
OccupancyFractionOutsideLightDisturbance[]	DCAGS	1322	

OneTemperatureCellPerWP(yes=1,no=0)	NFENV	123	
OtherVegetableConsumptionRate1[kg/yr]	GENTPA	1103	
OtherVegetableConsumptionRate2[kg/yr]	GENTPA	1115	
OtherVegetableConsumptionRate3[kg/yr]	GENTPA	1127	
OtherVegetableConsumptionRate4[kg/yr]	GENTPA	1139	
OtherVegetableConsumptionRate5[kg/yr]	GENTPA	1151	
OtherVegetableConsumptionRate6[kg/yr]	GENTPA	1163	
OtherVegetableIrrigationRateCB[in/yr]	GENTPA	1074	
OtherVegetableIrrigationRatePB[in/yr]	GENTPA	1060	
OtherVegetableIrrigationTimeCB[mo/yr]	GENTPA	1081	
OtherVegetableIrrigationTimePB[mo/yr]	GENTPA	1067	
OuterActivationEnergyPassiveCurrDens[J/mol]	EBSFAIL	206	
OuterActivationEnergyReductionReactHighpH[J/mole]	EBSFAIL	194	
OuterActivationEnergyReductionReactLowpH[J/mole]	EBSFAIL	195	
OuterChargeTransferCoefReductionReactHighpH	EBSFAIL	190	
OuterChargeTransferCoefReductionReactLowpH	EBSFAIL	191	
OuterDeltaEcritInh[mV]	EBSFAIL	212	
OuterEffectiveReactionOrderHHighpH	EBSFAIL	196	
OuterEffectiveReactionOrderHLowpH	EBSFAIL	197	
OuterInhibitingCarbonateToCl	EBSFAIL	210	
OuterInhibitingNitrateToCl	EBSFAIL	209	
OuterInhibitingSulfateToCl	EBSFAIL	211	
OuterOverpackErpIntercept	EBSFAIL	235	
OuterOverpackErpSlope	EBSFAIL	237	
OuterReferenceCurrReductionReactHighpH[C/(m2*yr)]	EBSFAIL	192	
OuterReferenceCurrReductionReactLowpH[C/(m2*yr)]	EBSFAIL	193	
OuterWPActivationEnergyforWaterReduction[J/mole]	EBSFAIL	246	
OuterWPBetaKineticsParameterforWater	EBSFAIL	243	
OuterWPRateConstantforWaterReduction[coulomb-m/m^2/yr]	EBSFAIL	245	
OuterWPThickness[m]	EBSFAIL	226	
OutputMode(0=None,1=All,2=UserDefined)	Output	60	
OxygenPartialPressure[atm]	EBSREL	448	
ParticleShapeParameter	ASHPLUMO	1239	
PerchedBucketVolumePerSAarea[m3/m2]	NFENV	138	
PermanentLossColloidFilterFactor_BFw_[]	UZFT	719	
PermanentLossColloidFilterFactor_CHnv[]	UZFT	715	
PermanentLossColloidFilterFactor_CHnz[]	UZFT	716	
PermanentLossColloidFilterFactor_Invert_Ja[]	EBSFILT	620	
PermanentLossColloidFilterFactor_Invert_Jc[]	EBSFILT	621	
PermanentLossColloidFilterFactor_Invert_Jp[]	EBSFILT	622	
PermanentLossColloidFilterFactor_Invert_Jt[]	EBSFILT	623	
PermanentLossColloidFilterFactor_PPw_[]	UZFT	717	
PermanentLossColloidFilterFactor_TSw_[]	UZFT	714	
PermanentLossColloidFilterFactor_UCF_[]	UZFT	718	
PermanentLossColloidFilterFactor_UFZ_[]	UZFT	720	
pH_AllUZ_SZLayers[StandardUnits]	UZFT	636	
pHForGlassModel[]	Glass	581	
pHParameterHighRange[]	Glass	583	
pHParameterLowRange[]	Glass	586	
PlantUptakeScaleFactor	GENTPA	1173	
PlumeCaptureModel(1=UserDefined,2=Calculated)	DCAGW	1042	
PlumeThickness[m]	DCAGW	1044	
PluvialDilutionModel(1=UserDefined,2=PumpingRate)	DCAGW	1051	
PluvialSwitchTime[yr]	DCAGW	1050	
PluvialWellPumpingRateAtReceptorGroup[gal/day]	DCAGW	1053	
PorosityOfScaleonWP	EBSFAIL	266	
PostEruptionYieldVolumeFluvialAsh[m/event]	ASHREMOB	1334	
PoultryConsumptionRate1[kg/yr]	GENTPA	1107	

PoultryConsumptionRate2[kg/yr]	GENTPA	1119	
PoultryConsumptionRate3[kg/yr]	GENTPA	1131	
PoultryConsumptionRate4[kg/yr]	GENTPA	1143	
PoultryConsumptionRate5[kg/yr]	GENTPA	1155	
PoultryConsumptionRate6[kg/yr]	GENTPA	1167	
PoultryFeedGrowTime[day]	GENTPA	1087	
PoultryFeedIrrigationRateCB[in/yr]	GENTPA	1078	
PoultryFeedIrrigationRatePB[in/yr]	GENTPA	1064	
PoultryFeedIrrigationTimeCB[mo/yr]	GENTPA	1085	
PoultryFeedIrrigationTimePB[mo/yr]	GENTPA	1071	
PPw_Thickness_10SubArea[m]	UZFT	972	
PPw_Thickness_1SubArea[m]	UZFT	909	
PPw_Thickness_2SubArea[m]	UZFT	916	
PPw_Thickness_3SubArea[m]	UZFT	923	
PPw_Thickness_4SubArea[m]	UZFT	930	
PPw_Thickness_5SubArea[m]	UZFT	937	
PPw_Thickness_6SubArea[m]	UZFT	944	
PPw_Thickness_7SubArea[m]	UZFT	951	
PPw_Thickness_8SubArea[m]	UZFT	958	
PPw_Thickness_9SubArea[m]	UZFT	965	
Preexponential_SFDissolutionModel2	EBSREL	451	
PresentDayDilutionModel(0,1,2,3,4)	DCAGW	1047	
ProbabilityForNWOrientationOfFaults	FAULTO	1201	
RadiusOfSFGrain[m]	EBSREL	489	
RateOfReductionOfMassLoadingFactor[1/yr]	DCAGS	1312	
RatioOfLastToFirstTimeStepAfterCompliancePeriod	Simulation Times	58	
RatioOfLastToFirstTimeStepInCompliancePeriod	Simulation Times	56	
RD_Invert_Am	EBSREL	455	
RD_Invert_C	EBSREL	465	
RD_Invert_Cl	EBSREL	464	
RD_Invert_Cm	EBSREL	452	
RD_Invert_Cs	EBSREL	460	
RD_Invert_I	EBSREL	461	
RD_Invert_Nb	EBSREL	467	
RD_Invert_Ni	EBSREL	463	
RD_Invert_Np	EBSREL	456	
RD_Invert_Pb	EBSREL	459	
RD_Invert_Pu	EBSREL	453	
RD_Invert_Ra	EBSREL	458	
RD_Invert_Se	EBSREL	466	
RD_Invert_Tc	EBSREL	462	
RD_Invert_Th	EBSREL	457	
RD_Invert_U	EBSREL	454	
ReceptorAgeGroup(1=Nfnt,2=Tod,3=PTeen,4=Teen,5=Adlt,6=AdltFG R11)	GENTPA	1055	
ReceptorGroup(1=Farming,2=Residential)	DCAGW	1040	
ReceptorGroupArea[m2]	ASHRMOVO	1307	
ReferencepH	EBSFAIL	263	
Reflux2LossD	NFENV	145	
Reflux2LossI	NFENV	144	
Reflux2Period	NFENV	143	
Reflux2Porosity	NFENV	140	
Reflux2SatInit	NFENV	141	
Reflux2SatResid	NFENV	142	
Reflux2Thickness	NFENV	139	
RefTemperaturePassiveCurrDens[K]	EBSFAIL	208	
RelativeHumidityForVentilatedAir[]	NFENV	117	
RelativeHumidityTransitionTimeAfterClosure[yr]	NFENV	116	

RelativeRateOfBlanketRemoval[l/yr]	ASHRMOVO	1249	
RewettingHumidity	NFENV	120	
RNtoDetermineFaultOrientation	FAULTO	1202	
RNtoDetermineIfExtrusiveOrIntrusiveVolcanicEvent	VOLCANO	1218	
RockMassDensityForRockTypeOne[kg/m^3]	SEISMO	302	
RockMassDensityForRockTypeTwo[kg/m^3]	SEISMO	303	
SafetyFactor	EBSFAIL	268	
SaturatedZoneMinimumVelocityChangeFactor[Fraction]	SZFT	1037	
SeedForRandomNumber	Sampling	46	
SeedForRandomNumberForSEISMO	SEISMO	281	
SeepageThresholdT[C]	NFENV	118	
SeismicDisruptiveScenarioFlag(yes=1,no=0)	Disruptive Scenarios	36	
SeismicHazardCurveforSEISMO	SEISMO	282	
SelectAppendFiles	Output	64	
SelectParticleModel(1,2)	NFENV	84	
SelectRefluxModel(1,2,3)	NFENV	135	
SelectThermalModel(1,2)	NFENV	82	
SelfDiffusionCoefficientOfWaterAt20C[m^2/s]	Diffusion	594	
SFC-14InventoryPerKgSF[ci]	EBSREL	493	
SFDensity[kg/m3]	EBSREL	446	
SFWettedFraction_Corrosion_1	EBSREL	565	
SFWettedFraction_Corrosion_10	EBSREL	574	
SFWettedFraction_Corrosion_2	EBSREL	566	
SFWettedFraction_Corrosion_3	EBSREL	567	
SFWettedFraction_Corrosion_4	EBSREL	568	
SFWettedFraction_Corrosion_5	EBSREL	569	
SFWettedFraction_Corrosion_6	EBSREL	570	
SFWettedFraction_Corrosion_7	EBSREL	571	
SFWettedFraction_Corrosion_8	EBSREL	572	
SFWettedFraction_Corrosion_9	EBSREL	573	
SFWettedFraction_FAULTO	EBSREL	523	
SFWettedFraction_Initial_1	EBSREL	513	
SFWettedFraction_Initial_10	EBSREL	522	
SFWettedFraction_Initial_2	EBSREL	514	
SFWettedFraction_Initial_3	EBSREL	515	
SFWettedFraction_Initial_4	EBSREL	516	
SFWettedFraction_Initial_5	EBSREL	517	
SFWettedFraction_Initial_6	EBSREL	518	
SFWettedFraction_Initial_7	EBSREL	519	
SFWettedFraction_Initial_8	EBSREL	520	
SFWettedFraction_Initial_9	EBSREL	521	
SFWettedFraction_SEISMO1_1	EBSREL	525	
SFWettedFraction_SEISMO1_10	EBSREL	534	
SFWettedFraction_SEISMO1_2	EBSREL	526	
SFWettedFraction_SEISMO1_3	EBSREL	527	
SFWettedFraction_SEISMO1_4	EBSREL	528	
SFWettedFraction_SEISMO1_5	EBSREL	529	
SFWettedFraction_SEISMO1_6	EBSREL	530	
SFWettedFraction_SEISMO1_7	EBSREL	531	
SFWettedFraction_SEISMO1_8	EBSREL	532	
SFWettedFraction_SEISMO1_9	EBSREL	533	
SFWettedFraction_SEISMO2_1	EBSREL	535	
SFWettedFraction_SEISMO2_10	EBSREL	544	
SFWettedFraction_SEISMO2_2	EBSREL	536	
SFWettedFraction_SEISMO2_3	EBSREL	537	
SFWettedFraction_SEISMO2_4	EBSREL	538	
SFWettedFraction_SEISMO2_5	EBSREL	539	
SFWettedFraction_SEISMO2_6	EBSREL	540	

SFWettedFraction_SEISMO2_7	EBSREL	541	
SFWettedFraction_SEISMO2_8	EBSREL	542	
SFWettedFraction_SEISMO2_9	EBSREL	543	
SFWettedFraction_SEISMO3_1	EBSREL	545	
SFWettedFraction_SEISMO3_10	EBSREL	554	
SFWettedFraction_SEISMO3_2	EBSREL	546	
SFWettedFraction_SEISMO3_3	EBSREL	547	
SFWettedFraction_SEISMO3_4	EBSREL	548	
SFWettedFraction_SEISMO3_5	EBSREL	549	
SFWettedFraction_SEISMO3_6	EBSREL	550	
SFWettedFraction_SEISMO3_7	EBSREL	551	
SFWettedFraction_SEISMO3_8	EBSREL	552	
SFWettedFraction_SEISMO3_9	EBSREL	553	
SFWettedFraction_SEISMO4_1	EBSREL	555	
SFWettedFraction_SEISMO4_10	EBSREL	564	
SFWettedFraction_SEISMO4_2	EBSREL	556	
SFWettedFraction_SEISMO4_3	EBSREL	557	
SFWettedFraction_SEISMO4_4	EBSREL	558	
SFWettedFraction_SEISMO4_5	EBSREL	559	
SFWettedFraction_SEISMO4_6	EBSREL	560	
SFWettedFraction_SEISMO4_7	EBSREL	561	
SFWettedFraction_SEISMO4_8	EBSREL	562	
SFWettedFraction_SEISMO4_9	EBSREL	563	
SFWettedFraction_VOLCANO	EBSREL	524	
SkewnessOfDistribution[]	NFENV	93	
SlopeOfCrackAreaCurve[m^2/yr]	Diffusion	591	
SoilBulkDensity[g/cm3]	GENTPA	1193	
SoilContaminationExposureTime1[hr]	GENTPA	1112	
SoilContaminationExposureTime2[hr]	GENTPA	1124	
SoilContaminationExposureTime3[hr]	GENTPA	1136	
SoilContaminationExposureTime4[hr]	GENTPA	1148	
SoilContaminationExposureTime5[hr]	GENTPA	1160	
SoilContaminationExposureTime6[hr]	GENTPA	1172	
SoilVolumetricWaterContent	GENTPA	1194	
SolubilityAm[kg/m3]	EBSREL	497	
SolubilityC[kg/m3]	EBSREL	502	
SolubilityCl[kg/m3]	EBSREL	501	
SolubilityCm[kg/m3]	EBSREL	504	
SolubilityCs[kg/m3]	EBSREL	509	
SolubilityI[kg/m3]	EBSREL	499	
SolubilityNb[kg/m3]	EBSREL	512	
SolubilityNi[kg/m3]	EBSREL	510	
SolubilityNp[kg/m3]	EBSREL	498	
SolubilityOfActiniumInVolcanicAsh[moles/liter]	ASHRMOVO	1290	
SolubilityOfAmericiumInVolcanicAsh[moles/liter]	ASHRMOVO	1285	
SolubilityOfCarbonInVolcanicAsh[moles/liter]	ASHRMOVO	1306	
SolubilityOfCesiumInVolcanicAsh[moles/liter]	ASHRMOVO	1293	
SolubilityOfChlorineInVolcanicAsh[moles/liter]	ASHRMOVO	1305	
SolubilityOfCuriumInVolcanicAsh[moles/liter]	ASHRMOVO	1283	
SolubilityOfIodineInVolcanicAsh[moles/liter]	ASHRMOVO	1294	
SolubilityOfLeadInVolcanicAsh[moles/liter]	ASHRMOVO	1288	
SolubilityOfMolybdenumInVolcanicAsh[moles/liter]	ASHRMOVO	1299	
SolubilityOfNeptuniumInVolcanicAsh[moles/liter]	ASHRMOVO	1291	
SolubilityOfNickelInVolcanicAsh[moles/liter]	ASHRMOVO	1304	
SolubilityOfNiobiumInVolcanicAsh[moles/liter]	ASHRMOVO	1300	
SolubilityOfPaladiumInVolcanicAsh[moles/liter]	ASHRMOVO	1297	
SolubilityOfPlutoniumInVolcanicAsh[moles/liter]	ASHRMOVO	1284	
SolubilityOfProtactiniumInVolcanicAsh[moles/liter]	ASHRMOVO	1289	

SolubilityOfRadiumInVolcanicAsh[moles/liter]	ASHRMOVO	1287	
SolubilityOfSamariumInVolcanicAsh[moles/liter]	ASHRMOVO	1292	
SolubilityOfSeleniumInVolcanicAsh[moles/liter]	ASHRMOVO	1303	
SolubilityOfSilverInVolcanicAsh[moles/liter]	ASHRMOVO	1296	
SolubilityOfStrontiumInVolcanicAsh[moles/liter]	ASHRMOVO	1302	
SolubilityOfTechnetiumInVolcanicAsh[moles/liter]	ASHRMOVO	1298	
SolubilityOfThoriumInVolcanicAsh[moles/liter]	ASHRMOVO	1286	
SolubilityOfTinInVolcanicAsh[moles/liter]	ASHRMOVO	1295	
SolubilityOfUraniumInVolcanicAsh[moles/liter]	ASHRMOVO	1282	
SolubilityOfZirconiumInVolcanicAsh[moles/liter]	ASHRMOVO	1301	
SolubilityPb[kg/m3]	EBSREL	508	
SolubilityPu[kg/m3]	EBSREL	505	
SolubilityRa[kg/m3]	EBSREL	507	
SolubilitySe[kg/m3]	EBSREL	511	
SolubilityTc[kg/m3]	EBSREL	500	
SolubilityTh[kg/m3]	EBSREL	506	
SolubilityU[kg/m3]	EBSREL	503	
SortingCoefficient[]	NFENV	92	
SpecificHeatofYMRock[J/(kg-K)]	NFENV	162	
StandardDeviationOfMAPAboutMeanInOneTimePeriod[mm/yr]	UZFLOW	77	
StandardDeviationOfMATAboutMeanInOneTimePeriod[degC]	UZFLOW	78	
StartAtRealization	Sampling	50	
StartAtSubarea	Subareas	39	
StartingBlockPointerOne_1[]	SEISMO	304	
StartingBlockPointerOne_10[]	SEISMO	313	
StartingBlockPointerOne_2[]	SEISMO	305	
StartingBlockPointerOne_3[]	SEISMO	306	
StartingBlockPointerOne_4[]	SEISMO	307	
StartingBlockPointerOne_5[]	SEISMO	308	
StartingBlockPointerOne_6[]	SEISMO	309	
StartingBlockPointerOne_7[]	SEISMO	310	
StartingBlockPointerOne_8[]	SEISMO	311	
StartingBlockPointerOne_9[]	SEISMO	312	
StartingBlockPointerTwo_1[ ]	SEISMO	314	
StartingBlockPointerTwo_10[ ]	SEISMO	323	
StartingBlockPointerTwo_2[ ]	SEISMO	315	
StartingBlockPointerTwo_3[ ]	SEISMO	316	
StartingBlockPointerTwo_4[ ]	SEISMO	317	
StartingBlockPointerTwo_5[ ]	SEISMO	318	
StartingBlockPointerTwo_6[ ]	SEISMO	319	
StartingBlockPointerTwo_7[ ]	SEISMO	320	
StartingBlockPointerTwo_8[ ]	SEISMO	321	
StartingBlockPointerTwo_9[ ]	SEISMO	322	
StopAtRealization	Sampling	51	
StopAtSubarea	Subareas	40	
StreamTubeWidthMultiplier[]	SZFT	1036	
SubareaOfVolcanicEvent[ ]	VOLCANO	1224	
SubAreaWetFraction	EBSREL	436	
SubGrainFragmentRadiusAfterTransFrac[m]	EBSREL	491	
SubsystemEngineeringStudy	Importance Analysis	21	
SubsystemNatural Study	Importance Analysis	5	
SurfaceAreaFactor_BFw_[]	UZFT	866	
SurfaceAreaFactor_CHnv[]	UZFT	862	
SurfaceAreaFactor_CHnz[]	UZFT	863	
SurfaceAreaFactor_PPw_[]	UZFT	864	
SurfaceAreaFactor_SAV_[]	SZFT	1007	
SurfaceAreaFactor_STFF[]	SZFT	1008	
SurfaceAreaFactor_TSw_[]	UZFT	861	

SurfaceAreaFactor_UCF_[]	UZFT	865	
SurfaceAreaFactor_UFZ_[]	UZFT	867	
SurfaceAreaOfGlass[m^2/kg]	Glass	580	
SZFluxMultiplierAtGlacialMaximum[]	SZFT	1038	
SZFractureForceFactorForKdToRd	SZFT	977	
TabularTemperatureRHFlag(yes=1,no=0)	NFENV	121	
TempCoefOfInnerPackErpIntercept	EBSFAIL	240	
TempCoefOfInnerPackErpSlope	EBSFAIL	242	
TempCoefOfOuterPackErpIntercept	EBSFAIL	236	
TempCoefOfOuterPackErpSlope	EBSFAIL	238	
TemperatureCoefficientOfErpInterceptWeld[mVSHE/C]	EBSFAIL	223	
TemperatureCoefficientOfErpSlopeWeld[mVSHE/C]	EBSFAIL	225	
TemperatureGradientInVicinityOfBoilingIsotherm[K/m]	NFENV	155	
TemperatureReferencePoint(1=SubareaCentroid,2=UserDefined)[]	NFENV	124	
ThermalConductivityOfAir[W/(m-C)]	NFENV	90	
ThermalConductivityOfBackfill[W/(m-C)]	NFENV	174	
ThermalConductivityOfDripShield[W/(m-C)]	NFENV	173	
ThermalConductivityOfFloor[W/(m-C)]	NFENV	168	
ThermalConductivityOfInnerOverpack[W/m-C]	NFENV	175	
ThermalConductivityOfOuterOverpack[W/m-C]	NFENV	176	
ThermalConductivityofYMRock[W/(m-K)]	NFENV	163	
ThermalDiffusivity[m^2/s]	NFENV	86	
ThicknessOfCladding[m]	EBSREL	492	
ThicknessOfWaterFilm[m]	EBSFAIL	233	
ThicknessRockfallRubbleAboveDripShieldCrown[m]	SEISMO	283	
ThresholdDisplacementforFaultDisruptionOfWp[m]	FAULTO	1198	
TiCorrosionRateVsFluorideSlope[]	DSFAIL	183	
TimeBetweenFlowEvents[yr]	ASHREMOB	1333	
TimeOfBackfillEmplaced[yr]	NFENV	171	
TimeOfNextFaultingEventInRegionOfInterest[yr]	FAULTO	1197	
TimeOfNextVolcanicEventinRegionOfInterest[yr]	VOLCANO	1215	
TimeStepForClimate[yr]	UZFLOW	76	
TortuosityOfBackfill[]	NFENV	91	
TortuosityOfScaleonWP	EBSFAIL	265	
TotalAnnualEvapotranspiration[m]yr]	GENTPA	1195	
TotalAreaOfCracksPerWPAtEmplacement[m^2]	Diffusion	590	
TotalWasteEmplacedInRepository[MTU]	NFENV	148	
TransitionLowHighpH	EBSFAIL	189	
TSw_Thickness_10SubArea[m]	UZFT	969	
TSw_Thickness_1SubArea[m]	UZFT	906	
TSw_Thickness_2SubArea[m]	UZFT	913	
TSw_Thickness_3SubArea[m]	UZFT	920	
TSw_Thickness_4SubArea[m]	UZFT	927	
TSw_Thickness_5SubArea[m]	UZFT	934	
TSw_Thickness_6SubArea[m]	UZFT	941	
TSw_Thickness_7SubArea[m]	UZFT	948	
TSw_Thickness_8SubArea[m]	UZFT	955	
TSw_Thickness_9SubArea[m]	UZFT	962	
UCF_Thickness_10SubArea[m]	UZFT	973	
UCF_Thickness_1SubArea[m]	UZFT	910	
UCF_Thickness_2SubArea[m]	UZFT	917	
UCF_Thickness_3SubArea[m]	UZFT	924	
UCF_Thickness_4SubArea[m]	UZFT	931	
UCF_Thickness_5SubArea[m]	UZFT	938	
UCF_Thickness_6SubArea[m]	UZFT	945	
UCF_Thickness_7SubArea[m]	UZFT	952	
UCF_Thickness_8SubArea[m]	UZFT	959	
UCF_Thickness_9SubArea[m]	UZFT	966	

UFZ_Thickness_10SubArea[m]	UZFT	975	
UFZ_Thickness_1SubArea[m]	UZFT	912	
UFZ_Thickness_2SubArea[m]	UZFT	919	
UFZ_Thickness_3SubArea[m]	UZFT	926	
UFZ_Thickness_4SubArea[m]	UZFT	933	
UFZ_Thickness_5SubArea[m]	UZFT	940	
UFZ_Thickness_6SubArea[m]	UZFT	947	
UFZ_Thickness_7SubArea[m]	UZFT	954	
UFZ_Thickness_8SubArea[m]	UZFT	961	
UFZ_Thickness_9SubArea[m]	UZFT	968	
UnsaturatedZoneMinimumVelocityChangeFactor[Fraction]	UZFT	631	
UseFluorideEnhancingFactor(0=no,1=yes)	DSFAIL	182	
UserDefinedLowerRealizationAppended	Output	61	
UserDefinedPlumeCaptureFraction	DCAGW	1043	
UserDefinedPluvialDilutionVolume[gal/day]	DCAGW	1052	
UserDefinedPresentDayDilutionVolume[gal/day]	DCAGW	1048	
UserDefinedUpperRealizationAppended	Output	62	
UserLeachRate[kg/yr/m2]	EBSREL	450	
UserTemperatureReferencePoint_x[UTM]	NFENV	125	
UserTemperatureReferencePoint_y[UTM]	NFENV	126	
UserTemperatureReferencePoint_z[m]	NFENV	127	
UZFLOWHydraulicPropertyUncertaintyDeviation[N(0,1)]	UZFLOW	72	
UZFLOWSampleMode	UZFLOW	70	
UZFractureForceFactorForKdtoRd	UZFT	634	
ViscosityOfAirAtSTP[g/cm-s]	ASHPLUMO	1229	
VolcanicColumnConstantBeta	ASHPLUMO	1245	
VolcanicEventDuration[s]	ASHPLUMO	1243	
VolcanicEventPower[W]	ASHPLUMO	1244	
VolcanismDisruptiveScenarioFlag(yes=1,no=0)	Disruptive Scenarios	34	
VolcanoModel(1=Geometric,2-Distribution)	VOLCANO	1214	
VolumeOfThermalExpansion[1/K]	NFENV	87	
WasteFormDissolutionEnhancementFactor[]	EBSREL	425	
WastePackageFlowMultiplicationFactor	EBSREL	435	
WastePackageOuterBarrierFailureLogStrain[]	SEISMO	301	
WastePackageOuterBarrierUltimateTensileStrength[Mpa]	SEISMO	280	
WastePackageOuterBarrierYieldStress[MPa]	SEISMO	300	
WastePackagePayload[MTU]	NFENV	156	
WaterContactMode_Corrosion(0=BathTub,1=FlowThrough)	EBSREL	434	
WaterContactMode_Faulting(0=BathTub,1=FlowThrough)	EBSREL	428	
WaterContactMode_Initial(0=BathTub,1=FlowThrough)	EBSREL	427	
WaterContactMode_SeismicInterval1(0=BathTub,1=FlowThrough)	EBSREL	430	
WaterContactMode_SeismicInterval2(0=BathTub,1=FlowThrough)	EBSREL	431	
WaterContactMode_SeismicInterval3(0=BathTub,1=FlowThrough)	EBSREL	432	
WaterContactMode_SeismicInterval4(0=BathTub,1=FlowThrough)	EBSREL	433	
WaterContactMode_Volcanic(0=BathTub,1=FlowThrough)	EBSREL	429	
WeightingFactorEolian[]	ASHREMOB	1335	
WeightingFactorFluvial[]	ASHREMOB	1330	
WeightingFactorInitialDeposit[]	ASHREMOB	1329	
WeldAdvectiveFraction[]	EBSREL	426	
WeldCrackLength[m]	Diffusion	589	
WeldCritChlorideConc[mol/L]	EBSFAIL	217	
WeldDeltaEcritInh[mV]	EBSFAIL	221	
WeldInhibitingCarbonateToCl	EBSFAIL	219	
WeldInhibitingNitrateToCl	EBSFAIL	218	
WeldInhibitingSulfateToCl	EBSFAIL	220	
WellPumpingRateAtReceptorGroup[gal/day]	DCAGW	1049	
WellPumpingRateGroundwaterProtection[gal/day]	Groundwater Protection	67	
WidthOfVolcanicDike[m]	VOLCANO	1222	

WindDirection[degrees]	ASHPLUMO	1241	
WindSpeed[cm/s]	ASHPLUMO	1242	
WPDiameter[m]	NFENV	129	
WPInternalVolume[m3]	EBSREL	444	
WPLength[m]	NFENV	128	
WPSpacingAlongEmplacementDrift[m]	NFENV	147	
WPsurfaceScaleThickness[m]	EBSFAIL	264	
WPWeldThickness[m]	EBSFAIL	188	
XLocationInRegionOfInterest[m]	VOLCANO	1216	
XLocationOfFaultingEventInRegionOfInterest[m]	FAULTO	1199	
YearsOfIrrigationPriorToIntakePeriod[yr]	GENTPA	1058	
YieldStrength[MPa]	EBSFAIL	267	
YLocationInRegionOfInterest[m]	VOLCANO	1217	
YLocationOfFaultingEventInRegionOfInterest[m]	FAULTO	1200	
ZyrOxideAndCrudC-14InvPerKgSF[ci]	EBSREL	495	

Files in Data Subdirectory			
File Name	**Contact**	**Date File Last Updated**	Confirmed
bunitdem.dat	R. Fedors	March 22, 2000	
burnup.dat	R. Benke	September 13, 2004	
careadem.dat	R. Fedors	September 25, 2002	
cdepdem.dat	R. Fedors	September 25, 2002	
climato1.dat	R. Fedors	August 15, 1997	
climato2.dat	R. Fedors	August 21, 2004	
coefkdeq.dat	D. Turner	September 14, 2004	
dilution.dat	R. Fedors	December 19, 2002	
drythick.dat	R. Fedors	June 14, 2003	
dsfailt.def	G. Adams	July 3, 2003	
ebsfail.def	O. Pensado	September 8, 2004	
ebsfilt.def	O. Osidele	May 28, 1998	
ebsrel.def	O. Osidele	October 17, 2003	
elevdem.dat	R. Fedors	March 22, 2000	
FILENAME.DAT	R. Fedors	February 11, 2000	
fluoride.dat	O. Pensado	May 29, 2002	
gbioac1.dat	P. LaPlante	February 11, 2000	
gdefauls.def	P. LaPlante	September 4, 2002	
gdefault.def	P. LaPlante	February 11, 2000	
gdosinc2.dat	P. LaPlante	February 11, 2000	
gftrans.def	P. LaPlante	February 11, 2000	
gftranss.def	P. LaPlante	September 4, 2002	
ggamen.dat	P. LaPlante	February 11, 2000	
ggenii.def	P. LaPlante	February 11, 2000	
ggeniis.def	P. LaPlante	September 4, 2002	
ggrdf.dat	P. LaPlante	February 11, 2000	
gnewdf.dat	P. LaPlante	March 29, 2000	
grmdlib.dat	P. LaPlante	March 20, 2000	
ia.dat	R. Janetzke	February 22, 2003	
itym.dat	R. Fedors	December 30, 2002	
maidtbl.dat	R. Fedors	March 29, 2000	
maswtbl.dat	R. Fedors	March 22, 2000	
maydtbl.dat	R. Fedors	December 30, 2002	
mechfail.def	G. Adams	August 21, 2004	
nuclides.dat	O. Pensado	September 11, 2004	
organdf.dat	P. LaPlante	September 24, 2000	
remob_lut.dat	R. Nes	September 23, 2004	
repdes.dat	R. Janetzke	July 19, 2003	
seisbs1.dis	G. Adams	December 17, 2002	x
seisbs2.dis	G. Adams	December 17, 2002	x
smaydtbl.dat	R. Fedors	December 30, 2002	
soildem.dat	R. Fedors	March 22, 2000	
strmtube.dat	J. Winterle	June 21, 2003	
sunitdem.dat	R. Fedors	March 22, 2000	
tefkti.inp	R. Fedors	May 8, 2000	
tpanames.dbs	R. Janetzke	September 26, 2004	
winddem.dat	R. Fedors	March 22, 2000	
wpflow.def	O. Osidele	February 2, 2000	

Parameters Used in TPA 5.0

Auxiliary Files

File Name	Data Expert	File description	Comments
bunitdem.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. The ITYM preprocessor software obtains bedrock type from the data file bunitdem.dat. This DEM assigns a bedrock unit to each pixel in the repository discretization according to the geologic map of Day et al. (1998). The same discretization is used for all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 m × 30 m. Bedrock unit data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of bedrock unit, and so forth for all 300 rows of bedrock type. The first 15 lines and last 5 lines of the file bunitdem.dat are provided below.	Data describe the well-studied surficial geology above the repository, drawing from the report by Day et. al (1998) and using the analysis described by Stothoff in scientific notebook #163. The spatial coverage of this external file needs to be updated using the license application repository footprint instead of the modified EDA-II design currently used by TPA 5.0

```
# DEM of bedrock unit for each pixel; used in ITYM preprocessor software.
NROWS 300
NCOLS 199
XLLCORNER  545010
YLLCORNER  4074000
CELLSIZE 30
NODATA_VALUE -9999
1
1
1
1
1
1
1
1
.
.
.
1
1
1
1
1
```

burnup.dat	R. Benke	This is the description of the file as it appears in the TPA User's Guide, 2002. The file burnup.dat contains input data on the temporal evolution of thermal outputs from the pressurized water reactor and boiling water reactor wastes. The file also contains information on the mix of pressurized water reactor and boiling water reactor wastes. Thermal outputs are presented in W/MTU. This input data file is read directly by invent.f instead of being read by reader.f. For thermal output as a function of time, the file is read until the end-of-file is encountered. Bioaccumulation Factor Library - (30-Aug-88) RAP Salt: Fish Crustacea Molluscs Plants Fr:Fish Crustacea Molluscs Plants Cleanup AC 30.0 1000.0 1000.0 1000.0 330.0 1000.0 1000.0 10000. 0.7 AM 2500.0 360.0 290.0 2900.0 100.0 100.0 100.0 3000. 0.7 SB 1000.0 100.0 1200.0 100.0 200.0 100.0 100.0 1000. 0.8 BA 10.0 1.0 20.0 100.0 200.0 200.0 200.0 500. 0.4 BE 1000.0 10000.0 10000.0 10000.0 10.0 50.0 50.0 200. 0.2 BI 15.0 1000.0 1000.0 10000.0 15.0 100000.0 100000.0 1500. 0.9 BK 50.0 500.0 20000.0 1.0 50.0 500.0 20000.0 1.0 BR 10.0 10.0 10.0 10.0 420.0 330.0 330.0 50 .0 CD 2000.0 5000.0 10000.0 1000.0 200.0 10000.0 10000.0 500. 0.6 CA 2.0 5.0 1.0 50.0 200.0 2000.0 2000.0 1000. 0.2 CF 50.0 500.0 2000.0 5000.0 25.0 1000.0 1000.0 5000 .0 C 20000.0 20000.0 20000.0 1800.0 9000.0 9000.0 9000.0 4500.0 1.0 CE 100.0 500.0 500.0 5000.0 500.0 1000.0 1000.0 4000. 0.2 CS 100.0 30.0 30.0 700.0 15000.0 500.0 500.0 1000. 0.9 CL 1.0 1.0 1.0 1.0 50.0 50.0 50.0 50.0 1.0 CR 600.0 500.0 1140.0 4000.0 20.0 2000.0 2000.0 4000 .0 CO 100.0 2000.0 3000.0 400.0 330.0 2000.0 2000.0 1000. 0.2 . . . ND 100.0 1000.0 1000.0 1000.0 25.0 1000.0 1000.0 5000. 0.2 RN 1.0 1.0 1.0 1.0 57.0 1.0 1.0 1. 0.0 SI 50000.0 50000.0 50000.0 50000.0 1000.0 10000.0 10000.0 50000. 0.7 GA 1000.0 10000.0 10000.0 1.0 1000.0 10000.0 10000.0 1. 0	Constant values justified by the low uncertainty and spatial variability expected for these time series which describe the thermal evolution of reactor wastes. Data draw from studies documented by CRWMS M&O (2000, 1993). The spatial coverage of this external file needs to be updated using the license application repository footprint instead of the modified EDA-II design currently used by TPA 5.0 [OBS]
careadem.dat	R. Fedors	[New to TPA 5.0]	Parameters describe well-studied surficial features above the repository using information supplied by the US Geological Survey. The current data should be used until TPA 5.0 is updated to reflect the expanded area of the license application repository.
cdepdem.dat	R. Fedors	[New to TPA 5.0]	Parameters describe well-studied surficial features above the repository and draw from information in elevdem.dat and soildem.dat. The current data should be used until TPA 5.0 is updated to reflect the expanded area of the license application repository.

climato1.dat R. Fedors

This is the description of the file as it appears in the TPA User's Guide, 2002.

The file climato1.dat contains data utilized by UZFLOW to determine the climatic conditions (i.e., distributions for temperature and precipitation). Specifically, the information in climato1.dat is the distributed perturbation data that are used to calculate the time-varying mean annual precipitation and the mean annual temperature. The data from this file are utilized to add "noise" to mean annual precipitation and mean annual temperature. The first 20 lines and last 5 lines of this file are listed below.

```
-5.7053335e-01
-1.0290445e+00
-1.1575096e+00
 9.8697251e-01
 1.2410360e+00
-3.0644614e-01
-1.9374674e-01
 1.1952564e+00
-1.1220900e+00
 6.9738339e-01
-5.2758746e-01
-8.1619222e-01
-2.0944012e-01
-1.7963021e+00
 8.7311825e-01
-1.4202760e-01
-1.4503307e-01
-5.1493563e-01
-3.9668029e-01
-7.5092842e-01
.
.
.
-8.6848566e-01
-7.6236354e-01
-7.6825708e-01
```

Source and justification information to be provided.

Possible obsolete or unused file? QA response: "The climato1.dat climate noise was not used in TPA 3.2 and 4.x because the marked changes in flux led to difficulties with NEFTRAN simulations of transport (according to NRC and CNWRA Performance Assessment staff). Testing would be needed to determine if the NEFTRAN limitation still occurs in TPA 5.0. If not, then the data set should be evaluated for updating or clarification of correlation structure"

climato2.dat	R. Fedors	UZFLOW reads three columns of data from climato2.dat. The first column is time in 1,000-years steps from 0 year to 100,000 years. The second and third columns are the fraction of full glacial mean annual precipitation and mean annual temperature, respectively. These data represent the variance from present-day precipitation and temperature conditions (0 at 0 year) to glacial conditions (1 at 50,000 years) and back to the equivalent of present-day conditions at 100,000 years. With these data, calculations performed in UZFLOW generate time-varying climatic conditions that provide distributions for mean annual precipitation and mean annual temperature. The first 21 lines and last 5 lines of climato2.dat are presented below. 0 0 0 1000 0.364364174 0.364364174 2000 0.50775941 0.50775941 3000 0.586599682 0.586599682 4000 0.632253812 0.632253812 5000 0.655878738 0.655878738 6000 0.655878738 0.655878738 7000 0.655878738 0.655878738 8000 0.655878738 0.655878738 9000 0.655878738 0.655878738 10000 0.655878738 0.655878738 11000 0.66734938 0.66734938 12000 0.678820022 0.678820022 13000 0.690290664 0.690290664 14000 0.701761306 0.701761306 15000 0.713231949 0.713231949 16000 0.724702591 0.724702591 17000 0.736173233 0.736173233 18000 0.747643875 0.747643875 19000 0.759114517 0.759114517 20000 0.770585159 0.770585159 . . . 96000 -0.0615372 -0.0615372 97000 -0.0541378 -0.0541378 98000 -0.0416805 -0.0416805 99000 -0.024316 -0.024316	Based on revisions (described in the questionnaire response) to the results documented in CRWMS M&O (2000), Mohanty et al. (2002), NRC (1997) and USGS (2000) (EXP, REL). Further revisions may be required, possibly based on the corresponding documents in the DOE license application.
coefkdeq.dat	D. Turner	[New to TPA 5.0]	Source and justification to be specified.

dilution.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. For the residential receptor group, the calculation of the fraction of total plume mass captured from well pumping uses data in dilution.dat. The DCAGW module reads data from dilution.dat and performs linear interpolation to find capture width, capture thickness, and screen length. The dilution.dat file supplies data for well capture width and well capture thickness as functions of pumping rate and aquifer thickness. Additionally, data for the well screen length are provided as a function of pumping rate. The well pumping rate, aquifer thickness, and plume thickness are sampled parameters defined in tpa.inp. Using values for capture width, capture thickness, screen length, and plume thickness, along with the sum of all streamtube widths read from strmtube.dat file, the fraction of the total plume mass captured by pumping is calculated. A complete listing of dilution.dat is presented below.	Source and justification to be provided; likely artificial data slected to meet related specifications in 10 CFR Part 63 (5km to 18km well site?)

```
TITLE: TPA4.0 Wellbore dilution data for the saturated zone.
TITLE: (data from R. Fedors 1/5/98 - prepared by rwr)
TITLE: (Updated 9/99)
** (data must be in the following sequence and format
**  with the same pump rates and aquifer thicknesses
**  for capture width and capture thicknesses - the screen
**  length pump rates can be different than those for
**  capture width and thickness)
**
**
** Number of Values for Pump Rate
 8
**
** Number of Values for Aquifer Thickness
 5
**
**
** Capture Width (meters)
**
**  Pump Rate          Aquifer Thickness
**   (m^3/d)                (m)
            300.  475.  650.  825.  1000.
**
     3.4     82.   82.   82.   82.    82.
    10.     142.  142.  142.  142.   142.
```

drythick.dat R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002.

When the user selects the reflux3 model, calculations performed in the NFENV module utilize the data in drythick.dat. The dry-out zone modeled in the TPA code is the region above the drift and below the condensate zone where heat from the drift vaporizes water that resides in the rock pore volume. This vapor moves upward to the condensate zone where the temperature is below boiling. For water to flow onto the waste package from the reflux zone, the water must either penetrate the dry-out zone or the dry-out zone thickness must be zero. The data in drythick.dat provide the dry-out zone thickness in meters at 18 different time steps beginning at 1 year through 900 years. These values were derived from MULTIFLO simulations performed offline. A complete listing of drythick.dat is presented as follows.

Source and justification to be specified.
File obsolete or not used? QA response: "update data, uncertianties not dealt with in TPA 4.0, update to discription, The details of the model that was the basis of the present data is not known. Will provide dryout thickness upon completion of the TEF model with improved represention

```
17
 1   1.0   0.0
 2  10.0   0.1
 3  20.0   1.0
 4  30.0   1.5
 5  40.0   1.7
 6  50.0   1.5
 7  60.0   1.5
 8  70.0   1.8
 9  80.0   2.9
10 100.0   4.6
11 200.0   7.3
12 300.0   7.4
13 500.0   6.6
14 600.0   5.6
15 700.0   4.7
16 800.0   3.8
17 900.0   2.7
18 1000.0   0.0
```

elevdem.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002.	Source and justification to be specified.

The ITYM preprocessor software obtains ground surface elevations (m) from the data file elevdem.dat. A DEM is used to assign a ground surface elevation to each pixel in the repository discretization. The same discretization is utilized to generate all of the DEM files listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in Universal Transverse Mercator (UTM) NAD27 easting and northing (m). The grid size is 30 m × 30 m. Ground surface elevation data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of ground surface elevations, and so forth for all 300 rows. The first 20 lines and last 5 lines of the file elevdem.dat are provided below.

```
# DEM of ground surface elevation [m] for each pixel; used in ITYM preprocessor software.
NCOLS 199
NROWS 300
XLLCORNER 545010
YLLCORNER 4074000
CELLSIZE 30
NODATA_VALUE -9999
```

Table H-4. Sample from itym.dat file illustrating format of sampling control

```
###### Start of Lithology Merge Information ######

MergeDEMType Bedrock
MergeIDList
1 Qtac
2 Qtc
3 cnw
4 tul
5 tmn
6 tll
7 tcw
8 tc
9 cuc
10 cul
11 ht2
```

filename.dat R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002.

No uncertainty; this file contains pointers to other data files used by GENTPA. The other data file names were verified to be correct.

The file FILENAME.DAT contains the path and filenames of the input files used by the GENTPA Version 1.0 called in the DCAGW module. The file format matches that of FILENAME.DAT described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

```
2    grmdlib.dat
3    METADATA.DAT
4    RMDBYELE.DAT
5    ggenii.inp
6    ggenii.out
7    gwork.buf
8    gftrans.inp
9    gbioac1.dat
10   ggrdf.dat
11   genv.in
12   DOSSUM.DAT
13   genv.out
14   DOSE.OUT
15   INTDF.OUT
16   CDEINC.OUT
17   DITTY.OUT
18   INTDF.IN
19   DITTYQA.OUT
20   CDE.OUT
21   gmedia.out
.
.
.
46   SEE2.DAT
47   SEE3.DAT
48
49   WORK2.BUF
50   WORK3.BUF
```

fluoride.dat O. Pensado [New to TPA 5.0]

This file did not exist in TPA 4.0. New information is required. The first 20 lines and last 5 lines of the file fluoride.dat are provided below:

Data source and justification to be specified
QA response states: "This File is generated as function of multifbe.dat and multiaf.dat and input parameters in tpa.inp. This File depends on other data Files and cannot be judged alone."

Time[yr]	Fluoride[M]
301 Time steps	
0.0000	0.00000E+00
2.3102	5.01000E-05
4.6744	5.01000E-05
7.0940	5.02000E-05
9.5702	5.03000E-05
12.1044	5.03819E-05
14.6980	5.04000E-05
17.3522	5.05000E-05
20.0686	5.06000E-05
22.8486	5.07000E-05
25.6937	5.07469E-05
28.6054	5.08504E-05
31.5852	5.09000E-05
34.6349	5.10000E-05
37.7559	5.11188E-05
40.9499	5.12095E-05
44.2188	5.13000E-05
47.5642	5.14000E-05
50.9879	5.15000E-05
54.4917	5.16000E-05
.	
.	
.	
96400.0000	2.89380E-03
97300.0000	2.92035E-03
98200.0000	2.94690E-03
99100.0000	2.97345E-03
100000.0000	3.00000E-03

gbioac1.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

File no longer used; bioaccumulation not currently included in the modeling for Yucca Mountain

The file gbioac1.dat contains bioaccumulation factors used by the GENTPA Version 1.0 code called in the DCAGW module. This file is not currently used, but this option is available. The bioaccumulation factors are used to relate the concentration of radionuclides in aquatic biota to the concentration of radionuclides in fresh and salt water. The file format matches that of bioac1.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

```
Bioaccumulation Factor Library - (30-Aug-88) RAP
Salt: Fish  Crustacea Molluscs  Plants Fr:Fish  Crustacea Molluscs  Plants Cleanup
AC   30.0   1000.0   1000.0   1000.0   330.0   1000.0   1000.0 10000. 0.7 AM   2500.0   360.0   290.0   2900.0   100.0   100.0   100.0  3000. 0.7
SB   1000.0   100.0   1200.0   100.0   200.0   100.0   100.0   1000. 0.8
BA   10.0    1.0    20.0   100.0   200.0   200.0   200.0   500. 0.4
BE   1000.0  10000.0  10000.0  10000.0    10.0    50.0    50.0   200. 0.2
BI   15.0   1000.0   1000.0  10000.0    15.0 100000.0 100000.0   1500. 0.9
BK   50.0   500.0  20000.0    1.0    50.0   500.0  20000.0    1.0
BR   10.0    10.0    10.0    10.0   420.0   330.0   330.0  50   .0
CD   2000.0   5000.0  10000.0   1000.0   200.0  10000.0  10000.0   500. 0.6
CA    2.0    5.0    1.0    50.0   200.0   2000.0   2000.0  1000. 0.2
CF   50.0   500.0   2000.0   5000.0    25.0   1000.0   1000.0  5000 .0
C  20000.0  20000.0  20000.0   1800.0   9000.0   9000.0   9000.0   4500.0 1.0
CE   100.0   500.0   500.0   5000.0   500.0   1000.0   1000.0  4000. 0.2
CS   100.0    30.0    30.0   700.0  15000.0   500.0   500.0  1000. 0.9
CL    1.0    1.0    1.0    1.0    50.0    50.0    50.0  50.0 1.0
CR   600.0   500.0   1140.0   4000.0    20.0   2000.0   2000.0  4000 .0
CO   100.0   2000.0   3000.0   400.0   330.0   2000.0   2000.0   1000. 0.2

.
.
.

ND   100.0   1000.0   1000.0   1000.0    25.0   1000.0   1000.0   5000.0.2
RN    1.0    1.0    1.0    1.0    57.0    1.0    1.0    1.0.0
SI  50000.0  50000.0  50000.0  50000.0   1000.0  10000.0  10000.0  50000.0 .7
GA   1000.0  10000.0  10000.0    1.0   1000.0  10000.0  10000.0    1.0
ER   100.0   500.0   500.0   5000.0   500.0   1000.0   1000.0   4000.0.2
```

ggamen.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

File no longer used; plume calculations now performed by the Ashplumo module.

The file ggamen.dat contains gamma energies utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file includes gamma energies (MeV/dis) for six energy groups for each radionuclide that are used in finite plume calculations. This file is not currently used, but is an available option. The GENTPA Version 1.0 code currently assumes an infinite plume size. The file format matches that of gamen.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

```
EXTGAM - Gamma Energies by Group for Finite Plume (13-May-90 RAP)(1-26-00 MAS Ag108m added)
H 3      0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
BE7      0.00000 0.04976 0.00000 0.00000 0.00000 0.00000
BE10     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
C 14     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
N 13     0.00000 0.00000 1.02001 0.00000 0.00000 0.00000
F 18     0.00000 0.00000 0.98858 0.00000 0.00000 0.00000
NA22     0.00000 0.00000 0.91878 1.27374 0.00000 0.00000
NA24     0.00000 0.00000 0.00000 1.36849 0.00000 2.75275
SI31     0.00000 0.00000 0.00000 0.00089 0.00000 0.00000
P 32     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
P 33     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
S 35     0.00000 0.00000 0.00000 0.00000 0.00000 0.00000
```

ggrdf.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

Data regarded as well known values taken from Federal Guidance report No. 12 and consistent with the requirements of 10 CFR Part 63

The file ggrdf.dat contains external dose coefficients utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file contains external dose coefficients for all radionuclides for air submersion, water surface, soil surface, deep soil, and buried waste. The file format matches that of grdf.dat described in Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

FGR 12 External DCFs(per-Sv/yr per Bq/n) (SJM/PAL) for 43 TSPA Nuclides, (MAS 1-26-00 Ag108m added, daughters updated), (MAS 1-28-00 FGR12 soil surface and air submersion values added)

n	FGR12 Air Submersion m^3	Water Surface L	FGR12 Soil Surface m^2	Buried 0.15 m m^3	Buried 0.5 m m^3	Buried 1.0 m m^3
C 14	7.06E-12	2.02E-11	5.08E-13	8.89E-19	3.86E-24	3.56E-31
CL36	7.04E-10	1.05E-09	2.12E-11	5.16E-15	1.09E-17	4.80E-21
NI59	0.00E+00	1.08E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NI63	0.00E+00	9.47E-13	0.00E+00	6.96E-24	4.40E-34	0.00E+00
SE79	9.56E-12	1.50E-11	6.53E-13	5.17E-19	2.03E-24	1.33E-31
SR90	2.38E-10	4.90E-10	8.96E-12	1.28E-15	1.41E-18	3.85E-22
Y 90	6.00E-09	1.74E-08	1.68E-10	3.83E-13	3.52E-15	1.31E-17
MO93	7.95E-10	2.08E-09	1.69E-10	0.00E+00	0.00E+00	0.00E+00
ZR93	0.00E+00	7.06E-13	0.00E+00	1.35E-24	3.32E-35	0.00E+00
NB93M	1.40E-10	4.31E-10	2.96E-11	0.00E+00	0.00E+00	0.00E+00
NB94	2.43E-06	3.54E-06	4.83E-08	1.55E-10	1.39E-12	2.13E-15
TC99	5.11E-11	9.35E-11	2.46E-12	4.52E-17	2.44E-21	3.90E-26
PD107	0.00E+00	3.23E-14	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AG108M	2.46E-06	6.60E-06	5.05E-08	3.54E-10	6.00E-12	3.29E-14
.						
.						
.						
CM243	1.86E-07	2.62E-07	3.94E-09	2.07E-12	1.12E-15	3.55E-20
PU243	3.25E-08	3.36E-08	7.61E-10	1.92E-13	5.34E-16	1.69E-19
AM243	6.88E-08	6.55E-08	1.69E-09	1.82E-14	1.77E-19	1.11E-25
NP239	2.43E-07	3.58E-07	5.14E-09	3.17E-12	3.97E-15	9.31E-19
PU239	1.34E-10	2.58E-10	1.16E-11	3.30E-16	1.22E-20	7.75E-27

gnewdf.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

Data regarded as well known values taken from Federal Guidance report No. 11 and consistent with the requirements of 10 CFR Part 64

The gnewdf.dat file contains internal dose coefficients utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file contains age-dependent internal dose coefficients for infant, toddler, preteen, teen, and adult receptor groups based on International Commission on Radiological protection Publication 72 (International Commission on Radiological Protection, 1996), with an alternative adult receptor group based on Federal Guidance Report 11 (U.S. Environmental Protection Agency, 1988). The first 20 lines and last 5 lines of this file are listed below.

Intake-to-Dose Conversion Factors for Inhalation and Ingestion from ICRP72 and Federal Guidance 11 (Sv/Bq) AL 1/24/00, (MAS 1-26-00 Ag108m added), (MAS 1-27-00 new FGR11 values for Bi210, Pb212, Bi212), (PAL 1-27-00 Np238 added)

```
      Infant   Infant  Toddler  Toddler  Pre-teen Pre-teen   Teen     Teen   Adult72  Adult72 AdultFG11 AdultFG11
Nuclide --ing---^---inh---^---ing---^---inh---^---ing---^---inh---^---ing---^---inh---^---ing---^---inh---^---ing---^---inh---
start_data
C 14   1.40E-09 1.90E-08 1.30E-09 1.40E-08 8.00E-10 7.40E-09 5.70E-10 6.40E-09 5.80E-10 5.80E-09 5.64E-10 5.64E-10
CL36   9.80E-09 3.10E-08 4.75E-09 2.05E-08 1.90E-09 1.00E-08 1.20E-09 8.80E-09 9.30E-10 7.30E-09 8.18E-10 5.93E-09
NI59   6.40E-10 1.70E-09 2.65E-10 1.23E-09 1.10E-10 5.90E-10 7.30E-11 4.60E-10 6.30E-11 4.40E-10 5.67E-11 7.31E-10
NI63   1.60E-09 4.80E-09 6.50E-10 3.50E-09 2.80E-10 1.70E-09 1.80E-10 1.30E-09 1.50E-10 1.30E-09 1.56E-10 1.70E-09
SE79   4.10E-08 2.30E-08 2.35E-08 1.65E-08 1.40E-08 8.70E-09 4.10E-09 7.60E-09 2.90E-09 6.80E-09 2.35E-09 2.66E-09
SR90   2.30E-07 4.20E-07 6.00E-08 3.35E-07 6.00E-08 1.80E-07 8.00E-08 1.60E-07 2.80E-08 1.60E-07 3.85E-08 3.51E-07
Y 90   3.10E-08 1.30E-08 1.50E-08 6.50E-09 5.90E-09 2.70E-09 3.30E-09 1.80E-09 2.70E-09 1.50E-09 2.91E-09 2.28E-09
MO93   7.90E-09 6.00E-09 5.95E-09 4.90E-09 4.00E-09 2.80E-09 3.40E-09 2.40E-09 3.10E-09 2.30E-09 3.64E-10 7.68E-09
ZR93   1.20E-09 7.00E-09 6.35E-10 5.45E-09 5.80E-10 3.30E-09 8.60E-10 3.30E-09 1.10E-09 3.30E-09 4.48E-10 8.67E-08
NB93M  1.50E-09 7.40E-09 6.85E-10 5.20E-09 2.70E-10 2.50E-09 1.50E-10 1.90E-09 1.20E-10 1.80E-09 1.41E-10 7.90E-09
NB94   1.50E-08 1.20E-07 7.50E-09 1.02E-07 3.40E-09 5.80E-08 2.10E-09 5.20E-08 1.70E-09 4.90E-08 1.93E-09 1.12E-07
TC99   1.00E-08 4.10E-08 3.55E-09 3.05E-08 1.30E-09 4.70E-08 8.20E-10 1.50E-08 6.40E-10 1.30E-08 3.95E-10 2.25E-09
PD107  4.40E-10 2.20E-09 2.10E-10 1.65E-09 8.10E-11 7.80E-10 4.60E-11 6.20E-10 3.70E-11 5.90E-10 4.04E-11 3.45E-09

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.
.

CM243  3.20E-06 1.60E-04 2.75E-07 1.23E-04 1.60E-07 7.30E-05 1.40E-07 6.50E-05 1.50E-07 6.90E-05 6.79E-07 8.30E-05
PU243  1.00E-09 6.00E-10 4.60E-10 3.00E-10 1.80E-10 1.40E-10 1.10E-10 9.20E-11 8.50E-11 8.60E-11 9.02E-11 4.44E-11
AM243  3.60E-06 1.80E-04 3.20E-07 1.45E-04 2.20E-07 1.00E-04 2.00E-07 9.10E-05 2.00E-07 9.60E-05 9.79E-07 1.19E-04
NP239  8.90E-09 5.60E-09 4.30E-09 3.10E-09 1.70E-09 1.60E-09 1.00E-09 1.30E-09 8.00E-10 1.00E-09 8.82E-10 6.78E-10
```

grmdlib.dat P. LaPlante This is the description of the file as it appears in the TPA User's Guide, 2002.

Well-known physical constants described in the GENII v1.485 user manual (Napier, et al. 1988)

The grmdlib.dat file is the radionuclide master library containing a list of all radionuclides and radiological decay data utilized by the GENTPA Version 1.0 code called in the DCAGW module. The file format matches that of rmdlib.dat described in Napier, et al., 1988, and a summary is included in Table B-2. For more information about this file consult Napier, et al., 1988. The first 20 lines and last 5 lines of this file are listed below.

```
Radionuclide Master Library  (11/28/90 RAP)(1-26-00 MAS Ag108m added)
H 3     4.49E+3 1 0 0.0000 0 0.0000  1   ND
BE7     5.33E+1 1 0 0.0000 0 0.0000  4   VY
BE10    5.84E+8 1 0 0.0000 0 0.0000  4   VY
C 14    2.09E+6 1 0 0.0000 0 0.0000  6   ND
N 13    6.92E-3 1 0 0.0000 0 0.0000  7   ND
F 18    7.62E-2 1 0 0.0000 0 0.0000  9   SD
NA22    9.50E+2 1 0 0.0000 0 0.0000 11   VD
NA24    6.25E-1 1 0 0.0000 0 0.0000 11   VD
SI31    1.09E-1 1 0 0.0000 0 0.0000 14   NW
P 32    1.43E+1 1 0 0.0000 0 0.0000 15   SD
P 33    2.54E+1 1 0 0.0000 0 0.0000 15   VD
S 35    8.74E+1 1 0 0.0000 0 0.0000 16   NW
CL36    1.10E+8 1 0 0.0000 0 0.0000 17   ND
K 40    4.67E11 1 0 0.0000 0 0.0000 19   ND
AR39    9.83E+4 1 0 0.0000 0 0.0000 18   ND
AR41    7.61E-2 1 0 0.0000 0 0.0000 18   ND
CA41    3.67E+7 1 0 0.0000 0 0.0000 20  1 VW
CA45    1.63E+2 1 0 0.0000 0 0.0000 20  1 VW
SC46    8.38E+1 1 0 0.0000 0 0.0000 21   VY
```

itym.dat	R. Fedors	This is the input file for the ITYM preprocessor used to generate two files used by the UZFLOW module of TPA 5.0, a file with mean values for the log of infiltration and a file with the standard deviations. The output files contain tables for a number of climates, each table contains the spatially variable mean or standard deviation of infiltration. By passing the mean and standard deviation to TPA, UZFLOW can then use a self-consistent sampling scheme, instead of ITYM sampling for uncertainty for the TPA code This is the control file for executing the ITYM preprocessor, which creates spatially dependent tables of mean and standard deviation of net infiltration for selected climates (temperature and precipitation) that span the full expected range of TPA 5.0 climates. The produced tables are interpolated in UZFLOW for the specific climate relevant to the current realization.	Data based on USFIC staff expert judgement, drawing from Flint (1996, 1998) and scientific notebook #163 (S. Stothoff). File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations

This is the description of the file as it appears in the TPA User's Guide, 2002.

The first 24 lines and the last 5 lines of the input control file itym.dat described in section H-4.1 are provided below.

```
# Input control file itym.dat for ITYM preprocessor software version 1.0, TPA 4.0
###### Size of Tables ######

num_MAP_table 3
num_MAT_table 5
num_pixel_merge 4
num_realize_per_table 500

###### Options ######

PathwaySum MaxOnly
Sampling Allow
RegrForm TPA4
zElevDEM elevdem.dat
zWindDEM winddem.dat
zSoilDEM soildem.dat
zBUnitDEM bunitdem.dat
zSUnitDEM sunitdem.dat
zMASWtbl maswtbl.dat
zDTBLout maidtbl.dat

###### Minimum, Maximum, and Typical Values ######
```

maidtbl.dat R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002. Obsolete file; replaced by maydtbl.dat

The module UZFLOW obtains mean annual infiltration (mm/yr) from the data file maidtbl.dat for a range of precipitation and temperature values. The six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celcius) are listed as VAR1 and VAR2 followed by the infiltration values (mm/yr) corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right comprise the next set of soil depths, and so forth for all of the rows of the infiltration map. The last record in the file is an end of file flag. The fir

```
# DEM table of expected MAI [mm/yr] for each pixel
# Table is a function of mean annual precipitation [mm/yr] and MAT [C]
# Coordinate system is UTM NAD27 [m]
# File generated on Thu Mar 23 06:47:17 2000
NCOLS      49
NROWS      75
XLLCORNER   545010.000000
YLLCORNER  4074000.000000
CELLSIZE      120.000000
NODATA_VALUE    -9999.000000
VAR1  1.0000000E+02
VAR2  0.0000000E+00
 7.23192569E+00
 8.11515613E+00
 8.57002278E+00
 8.79862242E+00
 8.60854144E+00
 7.50135501E+00
 9.37095935E+00
 9.73997409E+00
 .
 .
 .
 1.23902228E+02
```

maswtbl.dat	R. Fedors	This is the description of the file as it appears in the TPA User's Guide, 2002. Table mean annual clear-sky shortwave radiation [W/m2] values for different ground orientations used by ITYM to calculate actual incoming shortwave radiation incident on the ground surface for each pixel across net infiltration domain. Increments in north-south and east-west (YVLLCORNER, XVINCREMENT) are in degrees. The table describes a function of ground surface rotation using east-west rotation (degrees from horizontal) as the row-wise interpolating variable. Similarly, north-south rotation (degrees from horizontal) is the column-wise interpolating variable. The parameters XVLLCORNER and YVLLCORNER span the entire 180 range. The first 35 lines and last 5 lines of the file maswtbl.dat are provided below.	Uses standard, well-accepted equations documented in scientific notebook #163 (S. Stothoff) and confirmed in scientific notebook #227 or #432 (R. Fedors), with data from the Desert Rock meteorological station near Mercury, Nevada (OBS)

```
# Mean annual clear-sky shortwave radiation [W/m2] as a function of ground orientation; used in ITYM.
NROWS 37
NCOLS 37
XVLLCORNER      90
YVLLCORNER     -90
XVINCREMENT      -5
YVINCREMENT      -5
172.013
155.679
138.16
119.845
102.119
84.1245
66.7618
50.0491
34.5612
20.5591
9.07223
1.93457
0.0141618
0
0
0
0
0
0
```

maydtbl.dat	R. Fedors	The module UZFLOW obtains mean log10 annual infiltration (mm/yr) from the data file maydtbl.dat for a range of precipitation and temperature values. The first six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celsius) are listed as VAR1 and VAR2 followed by the log10 infiltration values (mm/yr) corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right comprise the next set of soil depths, and so forth for all of the rows of the log10 infiltration map. The last record in the file is an er # DEM table of expected log10(MAI [mm/yr]) for each pixel # Table is a function of MAP [mm/yr] and MAT [C] # Coordinate system is UTM NAD27 [m] # Run started Fri Dec 20 15:18:01 2002 NCOLS 49 NROWS 75 XLLCORNER 545010.000000 YLLCORNER 4074000.000000 CELLSIZE 120.000000 NODATA_VALUE -9999.000000 VAR1 1.0000000E+02 VAR2 0.0000000E+00 1.84727232E-01 2.76993825E-01 2.97543201E-01 3.11149514E-01 2.91550381E-01 2.58269354E-01 3.41522453E-01 3.56020867E-01 . . . 1.46827512E+00 1.40541279E+00 1.40250898E+00	Data based on USFIC staff expert judgement, drawing from itym.dat basecase input for ITYM. File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations. Data updates will be needed to match the license application repository footprint
multifaf.dat	L. Browning		Source and justification to be specified? Obsolete file? QA response: "SOURCES: Litchen et al. Lookup Table has been supplanted by more recent data and approach in TPA 5.0 Data in new file is addressed in the questionaires for chemical parameters (lower bounding values only)"
multifbe.dat	L. Browning		Obsolete file: see code revision SCR 478

multiflo.dat L. Browning The file multiflo.dat consists of output from a MULTIFLO simulation organized into 14 columns with each line representing one time step. The TPA code uses time and chloride concentration from this file. NFENV reads time from the first column and chloride concentration from the twelfth column. Obsolete file; replaced by multifaf.dat and multifbe.dat

The chloride concentrations are mapped onto TPA time steps, stored in an array, and passed to the EXEC in the NFENV argument list. This array is then passed to the EBSFAIL consequence module and the values written in the file chloridemf.dat. The stand-alone code failt.f reads the chloride concentration from chloridemf.dat and uses this information to calculate the waste package failure time. The first 20 lines and last 5 lines of multiflo.dat are provided below.

```
!date: 3/16/2000 file:copied multiflo output for {time,chloride} onto standard tpa input format
! property: pH, logO2aq, ...
! Time (years)      delt    pH   72 logO2a  72 ca+2    72 mg+2    72 na+     72 k+      72 h+      72 hco3-   72 sio2(a  72 Cl (molal) so4-2   72 o2(aq)
72
1.00E-08 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
5.42E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.001609 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.004543 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.008452 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.029853 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.070545 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.116320 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.152290 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.200000 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.244820 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.285640 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000200 0.00E+00 0.00E+00
0.331770 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000201 0.00E+00 0.00E+00
0.373280 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000201 0.00E+00 0.00E+00
0.383790 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000201 0.00E+00 0.00E+00
0.388800 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000202 0.00E+00 0.00E+00
0.399690 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000203 0.00E+00 0.00E+00
.
.
.
9956.300000 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000231 0.00E+00 0.00E+00
9980.100000 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.000231 0.00E+00 0.00E+00
```

nuclides.dat	O. Pensado	This is the description of the file as it appears in the TPA User's Guide, 2002. The file nuclides.dat contains radionuclide-specific information and is read by the invent.f module. The file provides indices identifying nuclides, names of radionuclides and radioelements, molecular weights (isotopic weights) in g/mol, half-lives in years, EPA limits (unitless), and inventories in Ci/MTU. This file contains information for 43 radioniclides and serves as the radionuclide database for the TPA code. The contents of the nuclides.dat file is presented here in its entirety. TITLE: TPA4.0 nuclide data used for the invent.f module. TITLE: (data extracted from invent.f - prepared by jmm) ** idx = Nuclide index ** NIS = namesisotopesave ** NES = nameselemsave ** CPMTU@10 = cipermtuat10yr ** --- = unitless ** Number of nuclides to be read follows: 43 **idx, NIS, NIS2, NIS3, NES, wmole, halflife, epalim, CPMTU@10 **--- ---, ---, ---, ---, [g/mol], [yr], [Ci/MTU], [Ci/MTU] 01 U238 U238 U238 U 238.0d0 4.468d9 0.10 3.15d-01 02 Cm246 Cm246 CM246 Cm 246.0d0 4.731d3 0.10 1.76d-01 03 Pu242 Pu242 PU242 Pu 242.0d0 3.869d5 0.10 2.37d+00 04 Am242m Am242m AM242M Am 242.0d0 1.520d2 0.10 1.19d+01 05 Pu238 Pu238 PU238 Pu 238.0d0 8.774d1 0.10 3.67d+03 06 U234 U234 U234 U 234.0d0 2.445d5 0.10 1.25d+00 07 Th230 Th230 TH230 Th 230.0d0 7.700d4 0.01 1.48d-04 08 Ra226 Ra226 RA226 Ra 226.0d0 1.600d3 0.10 4.50d-07 09 Pb210 Pb210 PB210 Pb 210.0d0 2.230d1 1.00 6.49d-08 10 Cm243 Cm243 CM243 Cm 243.0d0 2.850d1 0.10 3.00d+01 11 Am243 Am243 AM243 Am 243.0d0 7.380d3 0.10 2.89d+01 12 Pu239 Pu239 PU239 Pu 239.0d0 2.406d4 0.10 3.36d+02 13 U235 U235 U235 U 235.0d0 7.038d8 0.10 1.78d-02 14 Pa231 Pa231 PA231 Pa 231.0d0 3.277d4 0.10 2.83d-05 15 Ac227 Ac227 AC227 Ac 227.0d0 2.177d1 0.10 7.97d-06 16 Cm245 Cm245 CM245 Cm 245.0d0 8.499d3 0.10 4.71d-01 17 Pu241 Pu241 PU241 Pu 241.0d0 1.440d1 1000.00 9.26d+04	Best available data from a recent DOE update. Data for DSNF based on data extracted from Lwr Radiological Database; see "Inventory Abstraction ANL-WIS-MD-000006 REV 00 ICN 02, 2001" "PWR Source Term Generation and Evaluation BBAC00000-01717-0210-00010, REV 01" "SN0012T0810599.039"
organdf.dat	P. LaPlante	[New to TPA 5.0] This data file supports the calculations in DCAGW related to groundwater protection. Groundwater protection requirements require calculation of both individual organ doses and whole body effective dose. The data in this file are factors that convert ingestion of radionuclides in drinking water to organ doses and whole body dose. The organs include gonad, breast, lung, marrow, bone surface, thyroid, and remainder. The source document for the data is Federal Guidance No. 11 (U.S. Environmental Protection Agency, 1988). Due to uncertainties regarding the chemical form of the ingested radionuclides, the highest values reported are selected for each radionuclide for instances where more than one set of values for a radionuclide are offered in the source document	Data are taken from Federal Guidance report No. 11 (U.S. Environmental Protection Agency, 1988); the use of constant values is consistent with the regulatory requirements in 10 CFR Part 63

repdes.dat	R. Janetzke	This is the description of the file as it appears in the TPA User's Guide, 2002. The data file repdes.dat contains the coordinates defining the repository outline. The reader.f module uses the data in this file to compute the coordinates for the drift endpoints that are written to the drifts.dat file. The coordinate pairs in repdes.dat represent universal transverse mercator easting and universal transverse mercator easting northing in meters for the repository outline. The last point of the outline must be the same as the first to fully close the polygon. This discretization is illustrated in Figure 5-1. Information provided in the tpa.inp file to define the subarea coordinates must coincide with the repository outline coordinates presented in this file. If the subareas are larger than the repository outline, then the subareas will be partially filled since the drifts are restricted to the repository outline. The subareas are smaller then the repository, then not all of the emplaced waste will be accounted for in the full set of subareas. This file also provides the angle (in radians) of inclination of the drifts with respect to the east-west direction. The succeeding section identifies the n The drift placement starts in the first emplacement block. If the number of drifts exceeds the capacity [defined in tpa.inp through drift spacing, waste TITLE: TPA 4.0 repository design and emplacement data. ** ** angle - radians ** -.304d0 ** ** rep outline vertices. ** 13 547645.27,4079656.06 548588.98,4079377.55 548569.32,4078981. 548504.06,4077664.24 548479.71,4077173.06 548455,4076674.51 548155.7,4075962.63 547897.79,4076045.46 547655.97,4076123.07 547474.7,4077282.6 547370.95,4077922.04 547514.88,4079310.61	Repository design data from repository geometry file; avaliable when Bret Leslie receives data from DOE [OBS]
seisbs1.dis	G. Ofoegbu	[New to TPA 5.0] Scientific notebook 410, page 28 describes the input parameters used to create the file. A description of the sampling zone(and parameter rational) by MECHFIAL is included on pages 4-23 and 4-25 of MECHFAIL: a Total-System Performance Assessmetn Code Module for Evaluating Engineered Barier Performance under mechanical loading codition (Gute et. al. 2003)	No uncertainty; based on knowledge of similar systems (EXP; see Gute et al. 2003)
seisbs2.dis	G. Ofoegbu	[New to TPA 5.0] Scientific notebook 410 page 28 describes the input parameters (and rationale) used to create the file. A description of the sampling done by MECHFAIL is included on pages 4-23 and 4-25 of MECHFAIL: A total-system performance assessment code module for evaluating engineered barrier performance under mechanical loading conditions (Gute et. al . 2003)	Data derive from a user supplied piece wise CDF (see Gute et al. 2003)

smaydtbl.dat	R. Fedors	The module UZFLOW obtains standard deviations from the data file smaydtbl.dat to be used with the log10 mean annual infiltration (mm/yr) of file maydtbl.dat for a range of precipitation and temperature values. The first six header lines describe the number of columns and rows of data, the southwest corner map position in Universal Transverse Mercator NAD27 (m) easting and northing coordinates, the cell size in m, and a flag for no data value. The cell size is variable and is limited in the infiltration tabulator for Yucca Mountain (ITYM) preprocessor (Appendix H) to values that are multiples of 30. The remainder of the file is a series of digital elevation models stacked one on another. For each digital elevation model, the relevant precipitation (mm/yr) and temperature (degrees Celsius) are listed as VAR1 and VAR2 followed by the standard deviations of mean annual net infiltration corresponding to cell blocks beginning at the upper left-hand corner of the grid and continuing to the right (east) for each cell block. The second row of cell blocks from the top (to the north of the first row) of the grid moving left to right comprise the next set of standard deviations of	Data based on USFIC staff expert judgement, drawing from itym.dat basecase input for ITYM. File contains assorted parameters described using constant, normal and lognormal PDFs, and including correlations. Data updates will be needed to match the license application repository footprint

```
# DEM table of standard deviation of log10(MAI [mm/yr]) for each pixel
# Table is a function of MAP [mm/yr] and MAT [C]
# Coordinate system is UTM NAD27 [m]
# Run started Fri Dec 20 15:18:01 2002
NCOLS      49
NROWS      75
XLLCORNER   545010.000000
YLLCORNER  4074000.000000
CELLSIZE      120.000000
NODATA_VALUE    -9999.000000
VAR1  1.0000000E+02
VAR2  0.0000000E+00
 8.44994216E-01
 8.09859611E-01
 8.16263078E-01
 8.20930301E-01
 8.20978348E-01
 8.03584285E-01
 8.23860924E-01
 8.43079319E-01
      .
      .
      .
 9.67625710E-01
 1.04385791E+00
 1.03535410E+00
```

soildem.dat	R. Fedors	Description of file appears in Appendix: H	Calculations (involving a soil balance model) documented in scientific notebook #163 (S. Stothoff) (EXP), using data from the USGS (2001). Data updates will be needed to match the license application repository footprint

The ITYM preprocessor software obtains soil depths (m) from the data file soildem.dat. This DEM assigns a soil depth to each pixel in the repository discretization. The same discretization is used for the soil depth data and the ground surface elevation data in elevdem.dat, and all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM easting and northing (m). The grid size is 30 m × 30 m. Soil depth data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of soil depths, and so forth for all 300 rows of soil depths. The first 20 lines and last 5 lines of the file soildem.dat are provided below.

```
# DEM of soil depth [m] for each pixel; used in ITYM preprocessor software.
NROWS 300
NCOLS 199
XLLCORNER  545010
YLLCORNER  4074000
CELLSIZE 30
NODATA_VALUE -9999
0.13615
0.13615
0.435741
0.624657
0.147408
0.258274
0.159285
0.129658
0.170063
0.129678
0.308515
0.125574
0.130158
.
.
.
0.14188
0.137268
0.142815
```

strmtube.dat J. Winterle

This is the description of the file as it appears in the TPA User's Guide, 2002.

The data for streamtube widths and lengths as a function of distance to the tuff/alluvium interface are provided in strmtube.dat. Additionally, saturated zone streamtube flow rates are provided in this file. The information in strmtube.dat defines three saturated zone streamtubes. The file is divided into sections for the residential receptor group (referred to as near field) and the farming receptor group (referred to as far field). A distance of 20 km is specified in the strmtube.dat file to represent the far field or the farming receptor group. For convenience, the midpoint between the repository footprint and the far field (i.e., 10 km) is specified as the distance to represent the near field or the residential receptor group. In the total-system performance assessment input file tpa.inp, the distance is set at 10 km to select the residential receptor group and 20 km to select the farming receptor group.

The SZFT module utilizes streamtube locations to assign the closest of the three streamtubes to the subarea being analyzed. The distance from the subarea centroid to each of the three streamtubes is calculated in SZFT. The assignment of a streamtube to a subarea is based on the smallest of t

When the calculations are conducted for the residential receptor group, only values for the near field are written to nefii.inp. While, when the calculat

The DCAGW and DCAGS consequence modules also read strmtube.dat. Both DCAGW and DCAGS read the near-field and far-field receptor group

```
TITLE: TPA4.0 StreamTube data for the saturated zone.
TITLE: (data from J. Winterle 1/10/00)
TITLE: (based on flow net analysis using water table contours)
TITLE: (reduced number of streamtubes to 3)
**
 3     Number of streamtubes.
**
** Flow Rates (m^3/yr/m)
**
 3
600.
730.
470.
**
** Distance to Receptor Well
** ( set 2 values: near field and far field distance in [m]
**   and match this distance with the value specified for
**   "DistanceToReceptorGroup..." in tpa.inp and with the
```

Data are constants based on a deterministic model result because uncertainty is handled in the streamtube widrth multipior parameter. Strmtube.dat file is not the latest. TPA version 5 has an updated file that is based on modeling of SZ flow using 3-D MODFLOW; see scientific notebook 170E, chapt, 21

sunitdem.dat R. Fedors

This is the description of the file as it appears in the TPA User's Guide, 2002.

The ITYM preprocessor software obtains soil type from the data file sunitdem.dat. This DEM assigns a soil type to each pixel in the repository discretization based on TRW Environmental Safety Systems, Inc. (1997). The same discretization is used for all other DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 × 30 m. Soil type data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of soil types, and so forth for all 300 rows of soil types. The first 15 lines and last 5 lines of the file sunitdem.dat are provided below.

```
# DEM of soil type for each pixel; used in ITYM preprocessor software.
NROWS 300
NCOLS 199
XLLCORNER  545010
YLLCORNER  4074000
CELLSIZE 30
NODATA_VALUE -9999
1
1
3
1
5
5
5
5
.
.
.
5
5
5
5
5
```

Constant values based on USFIC expert judgement (OBS), using data from DOE (1997, 2000). Data updates will be needed to match the license application repository footprint

tefkti.inp R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002. Data source and justification to be specified

The TPA code user has the option of supplying data for time-varying waste package temperature and relative humidity in tefkti.inp, instead of calculating these values. This option may be selected in tpa.inp by changing the NFENV parameter "TabularTemperatureRHFlag" flag from the default value of 0 to 1. The user must also specify in tpa.inp the parameter "nsetUsedToPickTempRHDataSet," which can range from one to four. This value identifies the data set for waste package temperature and relative humidity values in tefkti.inp, which will be utilized in total-system performance assessment computations.

The file tefkti.inp contains 16 columns that are composed of 4 data sets. Each data set has four columns. These data were generated outside of the TPA code. The user can replace the data sets with different values or provide another data file. However, as currently implemented, the TPA code will read data only from any of the first four sets.

NFENV requires a specific file structure for tefkti.inp. The first line of tefkti.inp provides column headers. The remaining lines are organized in grou

```
Time  Twpnv60 Twnv80ybRHnv60yb
829  999999999 999999999999999999
1.00E-07 2.37E+01 2.37E+01 9.98E-01
3.00E-07 2.37E+01 2.37E+01 9.98E-01
7.00E-07 2.37E+01 2.37E+01 9.98E-01
1.50E-06 2.37E+01 2.37E+01 9.98E-01
3.10E-06 2.37E+01 2.37E+01 9.98E-01
6.30E-06 2.37E+01 2.37E+01 9.98E-01
1.27E-05 2.37E+01 2.37E+01 9.98E-01
2.55E-05 2.38E+01 2.37E+01 9.98E-01
5.11E-05 2.38E+01 2.37E+01 9.98E-01
1.02E-04 2.39E+01 2.37E+01 9.98E-01
2.05E-04 2.41E+01 2.37E+01 9.98E-01
4.10E-04 2.45E+01 2.37E+01 9.98E-01
8.19E-04 2.52E+01 2.37E+01 9.98E-01
1.64E-03 2.63E+01 2.37E+01 9.98E-01
3.13E-03 2.79E+01 2.38E+01 9.98E-01
5.29E-03 2.96E+01 2.39E+01 9.98E-01
8.31E-03 3.13E+01 2.41E+01 9.98E-01
1.24E-02 3.31E+01 2.44E+01 9.98E-01
```

winddem.dat R. Fedors This is the description of the file as it appears in the TPA User's Guide, 2002.

The ITYM preprocessor software obtains wind speed (m/s) from the data file winddem.dat. This DEM is used to assign a wind speed to each pixel in the repository discretization. The same discretization is utilized to generate all of the DEM listed in table H-2. The discretization consists of 199 columns and 300 rows with the lower left (SW) grid coordinate (545010, 4074000) expressed in UTM NAD27 easting and northing (m). The grid size is 30 m × 30 m. Ground surface elevation data correspond to pixels beginning at the upper left-hand (NW) corner of the grid and continuing to the right every 30 m. The second row of pixels from the top of the grid moving left to right comprise the next set of ground surface elevations, and so forth for all 300 rows. The first 20 lines and last 5 lines of the file winddem.dat are provided below.

Constants are used because annual averages do not vary significantly (EXP). Calculations documented in scientific notebook #163 (S. Stothoff) using local meteorological data from the Desert Rock meteorological station near Mercury, Nevada. Data updates will be needed to match the license application repository footprint

```
# DEM of wind speed [m/s] for each pixel; used in ITYM preprocessor software.
NROWS 300
NCOLS 199
XLLCORNER  545010
YLLCORNER  4074000
CELLSIZE 30
NODATA_VALUE -9999
3.90536
3.92542
3.981
3.92809
3.78322
3.59776
3.4067
3.31308
3.30678
3.38482
3.3542
3.29629
3.22809
.
.
.
3.23755
3.22683
3.24639
```

- ASHREMOB -
TPA Parameter Evaluation
(3/18/05)

Name	Description	OLD PDF Type	Old Value(s)	NEW PDF Type	New Values	Justification	CNWRA Contact	TPA Section	Relevant ISI
AshEvolutionMode	User selected mode for calculating evolution of ash at receptor location. 0 = wind direction fixed toward receptor w/o ash remobilizaiton. 1 = sampling wind direction and accounting for effects of ash remobilization.	iconstant	1	**SAME**	**SAME**		BEH	ASHREMOB	DOSE2
AshPlumeRealizationIndex[]		iuniform	1, 1024	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2
WeightingFactorInitialDeposit[]		constant	0.33	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2
WeightingFactorFluvial[]		constant	0.33	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2
~~AmbientSedimentyieldVolumeFromBasin[m/event]~~ AmbientSedimentYieldVolumePerBasinAreaPerEvent[m/event]		uniform	3.0e-6, 3.3e-5	**User Supplied (27 data pairs)**	**See AmbientSed-datapairs.doc**	See Note01	~~MAS~~ RRB	ASHREMOB	DOSE2
AreaDrainageBasinFluvial[m2]		constant	8.15e8	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2
TimeBetweenFlowEvents[yr]		constant	10.0	**constant**	**4.0**		~~MAS~~ RRB	ASHREMOB	DOSE2
~~PostEruptionYieldVolumeFluvialAsh[m/event]~~ PostEruptionFluvialAshYieldVolumePerAreaPerEvent[m/event]		uniform	1.0e-5, 1.0e-4	**Correlated Parameter**	**Twice the sampled value of:** **AmbientSedimentYieldVolumePerBasinAreaPerEvent[m/event]**	See Note02	~~MAS~~ RRB	ASHREMOB	DOSE2
WeightingFactorEolian[]		constant	0.33	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2

Name	Description	OLD PDF Type	Old Value(s)	NEW PDF Type	New Values	Justification	CNWRA Contact	TPA Section	Relevant ISI
DensityOfDistalAsh[g/m3]		constant	8.0e5	**SAME**	**SAME**		~~MAS~~ RRB	ASHREMOB	DOSE2

Note-01

1. Change in Parameter Name to better reflect the Units

2. TPA calculations in the ASHREMOB module for fluvial remobilization of tephra are based on significant flow events with a period specified by a parameter, TimeBetweenFlowEvents[yr], at a new constant value of 4 years. See the discussion below from Britt for more information on the derivation of sediment yield in units of m3/m2-yr, which is then converted to units of m3/m2-event with a multiplication by 4 yr/event to produce the distribution above:

Derived from the distribution function for Ambient Sediment yield (m3/ m2 yr), using these uncertainties:

Depositional area: 22-26 km2
Sediment thickness: 1-2 m
Age of sediments: 4-10 kyr

Using all ranges as uniform and 10,000 realizations, gives the attached distribution.

Note-02

1. Change in Parameter name to better reflect the Units

2. This is a coorelated parameter with the value set to twice the sampled value of AmbientSedimentYield VolumePerBasinAreaPerEvent[m/event]. See explanation from Don Hooper for more information on the latest relative sediment yield evaluation:

Regarding the Y-ash term covering accelerated erosion from the ash-covered portion of the basin, the answer is 2.0 (stats below). Since I used uneven time intervals to plot all 1550 time steps in that graph I showed you, I went back and did a quick interpolation for every 25th time step. This gave me 62 points plus time step 1. Calculations use the mean tephra mass within the watershed.

Minimum	1.0088897 (at 25,336 yrs when the accelerated yield from the more easily eroded tephra matches the ambient yield from the rest of the Fortymile Wash watershed)
Maximum	4.5707656 (actual maximum is 4.5796314 at time step 30 or ~500 yrs after the eruption)
Sum	125.9346
Points 63	
Mean	1.9989619 (or 2.0; over the lifetime of the tephra deposit, the mean yield is 2.0 times the ambient yield from the rest of thewatershed)
Median	1.6875
RMS	2.2033131
Std Dev.	0.93412571
Variance	0.87259085
Std Error	0.11768878
Skewness	1.1524141
Kurtosis	0.5071316

It seems to me that the shape of this curve will always be the same and 2.0 will be valid. (Perhaps a very large or very small tephra deposit may have a slightly different sediment recovery curve; I'll have to ponder this, but the calculations are derived for a relative sediment yield.) What will change is the duration of this accelerated erosion. But the TPA code can handle that time variable.

-Don

1.0E-05	0.0000
1.2E-05	0.0015
1.4E-05	0.0244
1.6E-05	0.0747
1.8E-05	0.1442
2.0E-05	0.2346
2.2E-05	0.3346
2.4E-05	0.4375
2.6E-05	0.5351
2.8E-05	0.6076
3.0E-05	0.6778
3.2E-05	0.7377
3.4E-05	0.7886
3.6E-05	0.8280
3.8E-05	0.8616
4.0E-05	0.8875
4.4E-05	0.9127
4.4E-05	0.9349
4.8E-05	0.9521
4.8E-05	0.9666
5.2E-05	0.9779
5.2E-05	0.9862
5.6E-05	0.9928
5.6E-05	0.9976
6.0E-05	0.9992
6.0E-05	0.9999
6.4E-05	1.0000