## 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

Properties Page

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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,
gwitt@cnwra.swri.edu, pbertetti@cnwra.swri.edu, plaplante@cnwra.swri.edu,
rbenke@cnwra.swri.edu, rgreen@cnwra.swri.edu, rnes@cnwra.swri.edu,
smohanty@cnwra.swri.edu, John Trapp <JST@nrc.gov>,
John Bradbury <JWB@nrc.gov>, Keith Compton <KLC@nrc.gov>,
Michael Waters <MDW1@nrc.gov>, Tina Ghosh <STG1@nrc.gov>,
Timothy McCartin <TJM3@nrc.gov>
Cc: bhill@cnwra.swri.edu, Bret Leslie <BWL@nrc.gov>,
Christopher Grossman <CJG2@nrc.gov>
Message-id: <s23e85cc.019@NRNWMS05.NRC.GOV>
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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. |

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|---|---|---|---|---|---|---|---|---|
| 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. |

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|---|---|---|---|---|---|---|---|---|
| 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) |

| Name | Description | PDF Type | Value(s) | CNWRA Contact | TPA Section | Order for TPA.INP | DOSE3 Team Input 3/18/05 |
|---|---|---|---|---|---|---|---|
| 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 |

| Name | Description | PDF Type | Value(s) | CNWRA Contact | TPA Section | Order for TPA.INP | DOSE3 Team Input 3/18/05 |
|---|---|---|---|---|---|---|---|
| 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. |

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| 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. |

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| 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. |

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| 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 |
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| 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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| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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.<br><br>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.<br><br># DEM of bedrock unit for each pixel, used in ITYM preprocessor software.<br>NROWS 300<br>NCOLS 199<br>XLLCORNER 545010<br>YLLCORNER 4074000<br>CELLSIZE 30<br>NODATA_VALUE -9999<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>.<br>.<br>.<br>1<br>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.<br><br>0 0 0<br>1000 0.364364174 0.364364174<br>2000 0.50775941 0.50775941<br>3000 0.586599682 0.586599682<br>4000 0.632253812 0.632253812<br>5000 0.655878738 0.655878738<br>6000 0.655878738 0.655878738<br>7000 0.655878738 0.655878738<br>8000 0.655878738 0.655878738<br>9000 0.655878738 0.655878738<br>10000 0.655878738 0.655878738<br>11000 0.66734938 0.66734938<br>12000 0.678820022 0.678820022<br>13000 0.690290664 0.690290664<br>14000 0.701761306 0.701761306<br>15000 0.713231949 0.713231949<br>16000 0.724702591 0.724702591<br>17000 0.736173233 0.736173233<br>18000 0.747643875 0.747643875<br>19000 0.759114517 0.759114517<br>20000 0.770585159 0.770585159<br>.<br>.<br>.<br>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.<br><br>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.<br><br>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.<br>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.<br><br>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.<br><br>2 grmdlib.dat<br>3 METADATA.DAT<br>4 RMDBYELE.DAT<br>5 ggenii.inp<br>6 ggenii.out<br>7 gwork.buf<br>8 gftrans.inp<br>9 gbioac1.dat<br>10 ggrdf.dat<br>11 genv.in<br>12 DOSSUM.DAT<br>13 genv.out<br>14 DOSE.OUT<br>15 INTDF.OUT<br>16 CDEINC.OUT<br>17 DITTY.OUT<br>18 INTDF.IN<br>19 DITTYQA.OUT<br>20 CDE.OUT<br>21 gmedia.out<br>.<br>.<br>.<br><br>46 SEE2.DAT<br>47 SEE3.DAT<br>48<br>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.<br><br>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.<br><br>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

Jorge Aranda, Steve Easterbrook, and Greg Wilson
*Department of Computer Science*
*University of Toronto, Toronto, Canada*
*{jaranda, sme, gvwilson}@cs.toronto.edu*

## 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<br>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.<br><br>This is the description of the file as it appears in the TPA User's Guide, 2002.<br><br>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.<br><br># Input control file itym.dat for ITYM preprocessor software version 1.0, TPA 4.0<br>###### Size of Tables ######<br><br>num_MAP_table 3<br>num_MAT_table 5<br>num_pixel_merge 4<br>num_realize_per_table 500<br><br>###### Options ######<br><br>PathwaySum MaxOnly<br>Sampling Allow<br>RegrForm TPA4<br>zElevDEM elevdem.dat<br>zWindDEM winddem.dat<br>zSoilDEM soildem.dat<br>zBUnitDEM bunitdem.dat<br>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.<br><br>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.<br><br># Mean annual clear-sky shortwave radiation [W/m2] as a function of ground orientation; used in ITYM.<br>NROWS 37<br>NCOLS 37<br>XVLLCORNER 90<br>YVLLCORNER -90<br>XVINCREMENT -5<br>YVINCREMENT -5<br>172.013<br>155.679<br>138.16<br>119.845<br>102.119<br>84.1245<br>66.7618<br>50.0491<br>34.5612<br>20.5591<br>9.07223<br>1.93457<br>0.0141618<br>0<br>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.<br><br>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.<br><br>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.<br><br>TITLE: TPA4.0 nuclide data used for the invent.f module.<br>TITLE: (data extracted from invent.f - prepared by jmm)<br>** idx = Nuclide index<br>** NIS = namesisotopesave<br>** NES = nameselemsave<br>** CPMTU@10 = cipermtuat10yr<br>** — = unitless<br>** Number of nuclides to be read follows:<br>43<br>**idx, NIS, NIS2, NIS3, NES, wmole, halflife, epalim, CPMTU@10<br>**— —, —, —, —, [g/mol], [yr], [Ci/MTU], [Ci/MTU]<br>01 U238 U238 U238 U 238.0d0 4.468d9 0.10 3.15d-01<br>02 Cm246 Cm246 CM246 Cm 246.0d0 4.731d3 0.10 1.76d-01<br>03 Pu242 Pu242 PU242 Pu 242.0d0 3.869d5 0.10 2.37d+00<br>04 Am242m Am242m AM242M Am 242.0d0 1.520d2 0.10 1.19d+01<br>05 Pu238 Pu238 PU238 Pu 238.0d0 8.774d1 0.10 3.67d+03<br>06 U234 U234 U234 U 234.0d0 2.445d5 0.10 1.25d+00<br>07 Th230 Th230 TH230 Th 230.0d0 7.700d4 0.01 1.48d-04<br>08 Ra226 Ra226 RA226 Ra 226.0d0 1.600d3 0.10 4.50d-07<br>09 Pb210 Pb210 PB210 Pb 210.0d0 2.230d1 1.00 6.49d-08<br>10 Cm243 Cm243 CM243 Cm 243.0d0 2.850d1 0.10 3.00d+01<br>11 Am243 Am243 AM243 Am 243.0d0 7.380d3 0.10 2.89d+01<br>12 Pu239 Pu239 PU239 Pu 239.0d0 2.406d4 0.10 3.36d+02<br>13 U235 U235 U235 U 235.0d0 7.038d8 0.10 1.78d-02<br>14 Pa231 Pa231 PA231 Pa 231.0d0 3.277d4 0.10 2.83d-05<br>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]<br>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.<br><br>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.<br><br>This file also provides the angle (in radians) of inclination of the drifts with respect to the e<br><br>The drift placement starts in the first emplacement block. If the number of drifts exceeds<br><br>TITLE: TPA 4.0 repository design and emplacement data.<br>**<br>** angle - radians<br>**<br>-.304d0<br>**<br>** rep outline vertices.<br>**<br>13<br>547645.27,4079656.06<br>548588.98,4079377.55<br>548569.32,4078981.<br>548504.06,4077664.24<br>548479.71,4077173.06<br>548455,4076674.51<br>548155.7,4075962.63<br>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]<br>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]<br>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<br><br># DEM table of standard deviation of log10(MAI [mm/yr]) for each pixel<br># Table is a function of MAP [mm/yr] and MAT [C]<br># Coordinate system is UTM NAD27 [m]<br># Run started Fri Dec 20 15:18:01 2002<br>NCOLS 49<br>NROWS 75<br>XLLCORNER 545010.000000<br>YLLCORNER 4074000.000000<br>CELLSIZE 120.000000<br>NODATA_VALUE -9999.000000<br>VAR1 1.0000000E+02<br>VAR2 0.0000000E+00<br>8.44994216E-01<br>8.09859611E-01<br>8.16263078E-01<br>8.20930301E-01<br>8.20978348E-01<br>8.03584285E-01<br>8.23860924E-01<br>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<br><br>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.<br><br># DEM of soil depth [m] for each pixel; used in ITYM preprocessor software.<br>NROWS 300<br>NCOLS 199<br>XLLCORNER 545010<br>YLLCORNER 4074000<br>CELLSIZE 30<br>NODATA_VALUE -9999<br>0.13615<br>0.13615<br>0.435741<br>0.624657<br>0.147408<br>0.258274<br>0.159285<br>0.129658<br>0.170063<br>0.129678<br>0.308515<br>0.125574<br>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.*

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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.<br><br>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.<br><br>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<br><br>When the calculations are conducted for the residential receptor group, only values for th<br><br>The DCAGW and DCAGS consequence modules also read strmtube.dat. Both DCAGW<br><br>TITLE: TPA4.0 StreamTube data for the saturated zone.<br>TITLE: (data from J. Winterle 1/10/00)<br>TITLE: (based on flow net analysis using water table contours)<br>TITLE: (reduced number of streamtubes to 3)<br>**<br>3 Number of streamtubes.<br>**<br>** Flow Rates (m^3/yr/m)<br>**<br>3<br>600.<br>730.<br>470.<br>** | 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.<br><br>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.<br><br># DEM of soil type for each pixel; used in ITYM preprocessor software.<br>NROWS 300<br>NCOLS 199<br>XLLCORNER 545010<br>YLLCORNER 4074000<br>CELLSIZE 30<br>NODATA_VALUE -9999<br>1<br>1<br>3<br>1<br>5<br>5<br>5<br>5<br>.<br>.<br>.<br>5<br>5<br>5<br>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

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| ** ASHREMOB | ASHREMOB | 1326 | |
| ** ASHRMOVO | ASHRMOVO | 1248 | |
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| ** UZFT | UZFT | 630 | |
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| AA_2_1[C/m2/yr] | EBSFAIL | 250 | |
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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 | |
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| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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 | |

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|---|---|---|---|
| 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.<br><br>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.<br><br>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.<br><br>Bioaccumulation Factor Library - (30-Aug-88) RAP<br>Salt: Fish Crustacea Molluscs Plants Fr:Fish Crustacea Molluscs Plants Cleanup<br>AC 30.0 1000.0 1000.0 1000.0 330.0 1000.0 1000.0 10000. 0.7<br>AM 2500.0 360.0 290.0 2900.0 100.0 100.0 100.0 3000. 0.7<br>SB 1000.0 100.0 1200.0 100.0 200.0 100.0 100.0 1000. 0.8<br>BA 10.0 1.0 20.0 100.0 200.0 200.0 200.0 500. 0.4<br>BE 1000.0 10000.0 10000.0 10000.0 10.0 50.0 50.0 200. 0.2<br>BI 15.0 1000.0 1000.0 10000.0 15.0 100000.0 100000.0 1500. 0.9<br>BK 50.0 500.0 20000.0 1.0 50.0 500.0 20000.0 1.0<br>BR 10.0 10.0 10.0 10.0 420.0 330.0 330.0 50 .0<br>CD 2000.0 5000.0 10000.0 1000.0 200.0 10000.0 10000.0 500. 0.6<br>CA 2.0 5.0 1.0 50.0 200.0 2000.0 2000.0 1000. 0.2<br>CF 50.0 500.0 2000.0 5000.0 25.0 1000.0 1000.0 5000 .0<br>C 20000.0 20000.0 20000.0 1800.0 9000.0 9000.0 9000.0 4500.0 1.0<br>CE 100.0 500.0 500.0 5000.0 500.0 1000.0 1000.0 4000. 0.2<br>CS 100.0 30.0 30.0 700.0 15000.0 500.0 500.0 1000. 0.9<br>CL 1.0 1.0 1.0 1.0 50.0 50.0 50.0 50.0 1.0<br>CR 600.0 500.0 1140.0 4000.0 20.0 2000.0 2000.0 4000 .0<br>CO 100.0 2000.0 3000.0 400.0 330.0 2000.0 2000.0 1000. 0.2<br><br>.<br>.<br>.<br><br>ND 100.0 1000.0 1000.0 1000.0 25.0 1000.0 1000.0 5000. 0.2<br>RN 1.0 1.0 1.0 1.0 57.0 1.0 1.0 1. 0.0<br>SI 50000.0 50000.0 50000.0 50000.0 1000.0 10000.0 10000.0 50000. 0.7<br>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.<br><br>0 0 0<br>1000 0.364364174 0.364364174<br>2000 0.50775941 0.50775941<br>3000 0.586599682 0.586599682<br>4000 0.632253812 0.632253812<br>5000 0.655878738 0.655878738<br>6000 0.655878738 0.655878738<br>7000 0.655878738 0.655878738<br>8000 0.655878738 0.655878738<br>9000 0.655878738 0.655878738<br>10000 0.655878738 0.655878738<br>11000 0.66734938 0.66734938<br>12000 0.678820022 0.678820022<br>13000 0.690290664 0.690290664<br>14000 0.701761306 0.701761306<br>15000 0.713231949 0.713231949<br>16000 0.724702591 0.724702591<br>17000 0.736173233 0.736173233<br>18000 0.747643875 0.747643875<br>19000 0.759114517 0.759114517<br>20000 0.770585159 0.770585159<br>.<br>.<br>.<br>96000 -0.0615372 -0.0615372<br>97000 -0.0541378 -0.0541378<br>98000 -0.0416805 -0.0416805<br>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.<br><br>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

.
.
.

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<br>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.<br><br>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<br><br># DEM table of expected log10(MAI [mm/yr]) for each pixel<br># Table is a function of MAP [mm/yr] and MAT [C]<br># Coordinate system is UTM NAD27 [m]<br># Run started Fri Dec 20 15:18:01 2002<br>NCOLS 49<br>NROWS 75<br>XLLCORNER 545010.000000<br>YLLCORNER 4074000.000000<br>CELLSIZE 120.000000<br>NODATA_VALUE -9999.000000<br>VAR1 1.0000000E+02<br>VAR2 0.0000000E+00<br>1.84727232E-01<br>2.76993825E-01<br>2.97543201E-01<br>3.11149514E-01<br>2.91550381E-01<br>2.58269354E-01<br>3.41522453E-01<br>3.56020867E-01<br>.<br>.<br>.<br>1.46827512E+00<br>1.40541279E+00<br>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.<br><br>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.<br><br>TITLE: TPA4.0 nuclide data used for the invent.f module.<br>TITLE: (data extracted from invent.f - prepared by jmm)<br>** idx = Nuclide index<br>** NIS = namesisotopesave<br>** NES = nameselemsave<br>** CPMTU@10 = cipermtuat10yr<br>** --- = unitless<br>** Number of nuclides to be read follows:<br>43<br>**idx, NIS, NIS2, NIS3, NES, wmole, halflife, epalim, CPMTU@10<br>**--- ---, ---, ---, ---, [g/mol], [yr], [Ci/MTU], [Ci/MTU]<br>01 U238 U238 U238 U 238.0d0 4.468d9 0.10 3.15d-01<br>02 Cm246 Cm246 CM246 Cm 246.0d0 4.731d3 0.10 1.76d-01<br>03 Pu242 Pu242 PU242 Pu 242.0d0 3.869d5 0.10 2.37d+00<br>04 Am242m Am242m AM242M Am 242.0d0 1.520d2 0.10 1.19d+01<br>05 Pu238 Pu238 PU238 Pu 238.0d0 8.774d1 0.10 3.67d+03<br>06 U234 U234 U234 U 234.0d0 2.445d5 0.10 1.25d+00<br>07 Th230 Th230 TH230 Th 230.0d0 7.700d4 0.01 1.48d-04<br>08 Ra226 Ra226 RA226 Ra 226.0d0 1.600d3 0.10 4.50d-07<br>09 Pb210 Pb210 PB210 Pb 210.0d0 2.230d1 1.00 6.49d-08<br>10 Cm243 Cm243 CM243 Cm 243.0d0 2.850d1 0.10 3.00d+01<br>11 Am243 Am243 AM243 Am 243.0d0 7.380d3 0.10 2.89d+01<br>12 Pu239 Pu239 PU239 Pu 239.0d0 2.406d4 0.10 3.36d+02<br>13 U235 U235 U235 U 235.0d0 7.038d8 0.10 1.78d-02<br>14 Pa231 Pa231 PA231 Pa 231.0d0 3.277d4 0.10 2.83d-05<br>15 Ac227 Ac227 AC227 Ac 227.0d0 2.177d1 0.10 7.97d-06<br>16 Cm245 Cm245 CM245 Cm 245.0d0 8.499d3 0.10 4.71d-01<br>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]<br>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.<br><br>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.<br><br>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<br><br>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<br><br>TITLE: TPA 4.0 repository design and emplacement data.<br>**<br>** angle - radians<br>**<br>-.304d0<br>**<br>** rep outline vertices.<br>**<br>13<br>547645.27,4079656.06<br>548588.98,4079377.55<br>548569.32,4078981.<br>548504.06,4077664.24<br>548479.71,4077173.06<br>548455,4076674.51<br>548155.7,4075962.63<br>547897.79,4076045.46<br>547655.97,4076123.07<br>547474.7,4077282.6<br>547370.95,4077922.04<br>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]<br>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]<br>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]~~<br><br>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]~~<br><br>PostEruptionFluvialAshYieldVolumePerAreaPerEvent[m/event] | | uniform | 1.0e-5, 1.0e-4 | **Correlated Parameter** | **Twice the sampled value of:**<br><br>**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~~<br>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 |