

Subject: MACCS sample problem A and NUREG-1150
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John,

I am responding to your conference call request regarding the differences in the MACCS/MACCS2 sample problem A input and the NUREG-1150 input. The most difficult problem was retrieving the NUREG-1150 input from archives. In my judgment, the largest impact results from the differences regarding the evacuation/non-evacuation split fraction between the two, i.e., 99.5%/0.5% for NUREG-1150 and 95%/5% for sample problem A. As you have so observantly noted, the MACCS2 user's guide is somewhat misleading in its description of the sample problems, and so I have added this item to my list of "ERRATA" for the documentation. I had no way of getting Charlie's or Jason's e-mail addresses, so I trust you will forward this to them. I have attached both a WordPerfect and a Word '98 file depending on your format preference. Don't hesitate to get in touch if you have questions regarding this information.

Best Regards,

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The differences in the NUREG-1150 input for Surry and Sample Problem A distributed with the MACCS/MACCS2 codes were determined by comparing the MACCS Sample Problem A with the NUREG-1150 input (since MACCS was used for both). Next the Sample Problem A for MACCS and MACCS2 were compared to evaluate if the step from MACCS to MACCS2 features and format had any impact. The differences are as follows:

ATMOS - all the input is the same except for some boundary weather values, some rain bin breakpoints, the seed number (which is irrelevant anyway, because now the platform is PC and in NUREG-1150 it was VAX), and some minor round-off in the input for the same source term (which will not be presented here):

<u>Variable</u>	<u>NUREG-1150</u>	<u>Sample Pr. A</u>
M2IBDSTB	1 (A-stability)	4 (D-stability)
M2BNDRAN	0.	5.
M2BNDWND	0.5	5.0
M4NRNINT	6	5
M4RNDSTS	40.23	32.19
"	80.47	-
M4RNRATE	1.0	2.0
"	2.0	4.0
"	3.0	6.0
M4IRSEED	1	79

(the met input file METSUR.INP is the same for all calculations)

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The ATMOS file differences between the MACCS Sample Problem A and the MACCS2 sample Problem A simply deal with the MACCS/MACCS2 transition and application of new features. There are essentially no differences in input data. The MACCS2/MACCS differences include:

- the psuedo-stable nuclide list as a result of the new decay chain processor,
- the dispersion data look up table – which essentially applies the same data in each instance, the MACCS2 problem implements the Tadmor/Gur correlation as a look-up table, the MACCS problem implements the Tadmor/Gur correlation in a power law model,
- the new MACCS2 parameter RDAPLFRC is set to "PARENT" which implements initial daughter release fractions by the parent isotope release group (this is how it is implemented in MACCS).

EARLY – all input the same except for organ definition, evacuation fraction (the cohort weighting was performed external to MACCS in NUREG-1150), some early health effects parameters, some latent health effects parameters (recall the current sample problem incorporates the changes in MACCS latent health effects models starting with Version 1.5.11.1 per LMF-132 recommendations):

<u>Variable</u>	<u>NUREG-1150</u>	<u>Sample Pr. A</u>
ODNUMORG	9	10
ODORGNAM	-	'BLAD WAL'
EZWTFRAC (evacuating cohort)	0.995 (external)	0.95 (internal)
EZWTFRAC (non-evacuating, non-sheltering cohort)	0.005 (external)	0.05 (internal)
EFATAGRP (for 'RED MARR')		
(EFFACA)	4.	3.8
(EFFACB)	6.0	5.0
EFATAGRP (for 'LOWER LI')		
(EFFTHR)	7.5	8.0
LCDDTHRE	-	0.2
LCACTHRE	1.5	0.0
LCANCERS (for 'LEUKEMIA')		
(DOSEFA)	0.39	1.0
(DOSEFB)	0.61	0.0
(CFRISK)	3.7E-3	9.70E-3
(CIRISK)	3.7E-3	9.70E-3
(DDREFA)	-	2.0
LCANCERS (for 'BONE')		
(DOSEFA)	0.39	1.0
(DOSEFB)	0.61	0.0
(CFRISK)	1.5E-4	9.00E-4
(CIRISK)	1.5E-4	9.00E-4
(DDREFA)	-	2.0
LCANCERS (for 'BREAST')		

(DOSEFA)	1.0	1.0
(DOSEFB)	0.0	0.0
(CFRISK)	6.0E-3	5.40E-3
(CIRISK)	1.7E-2	1.59E-2
(DDREFA)	-	1.0
LCANCERS (for 'LUNG')		
(DOSEFA)	0.39	1.0
(DOSEFB)	0.61	0.0
(CFRISK)	5.1E-3	1.55E-2
(CIRISK)	5.7E-3	1.73E-2
(DDREFA)	-	2.0
LCANCERS (for 'THYROID')		
(DOSEFA)	1.0	1.0
(DOSEFB)	0.0	0.0
(CFRISK)	7.2E-4	7.20E-4
(CIRISK)	7.2E-3	7.20E-3
(DDREFA)	-	1.0
LCANCERS (for 'GI')		
(DOSEFA)	0.39	1.0
(DOSEFB)	0.61	0.0
(CFRISK)	1.5E-2	3.36E-2
(CIRISK)	2.5E-2	5.75E-2
(DDREFA)	-	2.0
LCANCERS (for 'OTHER')		
(ORGNAME)	'LOWER LI'	'BLAD WAL'
(DOSEFA)	0.39	1.0
(DOSEFB)	0.61	0.0
(CFRISK)	7.5E-3	2.76E-2
(CIRISK)	1.3E-2	5.52E-2
(DDREFA)	-	2.0

The EARLY file differences between the MACCS Sample Problem A and the MACCS2 sample Problem A simply deal with the MACCS/MACCS2 transition and application of new features. There are only a few differences in essential input data (in the cancer model definition). The MACCS2/MACCS differences include:

- the DCF file name declaration
- the new organ list (with acute and lifetime prefixes A- and L-)
- the input for the new evacuation model, which is the old input in a new format (this includes the TRAVELPOINT = 'BOUNDARY' option, explicitly retained in MACCS2 to make comparisons to the earlier MACCS code)
- the elimination of the CIRISK coefficient for cancer injuries (setting it = 0.0) for all cancers except breast and lung, and changing the organ for 'OTHER' cancers from 'BLAD WAL' to 'L-EDEWBODY'.

CHRONC – all input the same except for site region definition information that is overridden in the site file (SURSIT.INP – which is the same file for both calculations – so these

parameters are not presented here), and the protective action guides for direct deposition and long-term transfer (the food action coupling flag was added subsequent to the N-1150 analysis):

<u>Variable</u>	<u>NUREG-1150</u>	<u>Sample Pr. A</u>
CHCOUPLD	-	.FALSE.
CHPAGMC (Sr-89)		
(PSCMLK)	2.1E06	2.2E07
(PSCOTH)	2.2E06	2.2E07
CHPAGMC (Sr-90)		
(PSCMLK)	4.6E04	2.4E05
(PSCOTH)	5.1E04	2.4E05
CHPAGMC (Cs-134)		
(PSCMLK)	1.4E05	2.2E05
(PSCOTH)	9.6E04	2.2E05
CHPAGMC (Cs-137)		
(PSCMLK)	1.9E05	2.7E05
(PSCOTH)	1.3E05	2.7E05
CHPAGMC (I-131)		
(PSCMLK)	1.0E05	1.3E06
(PSCOTH)	9.2E06	8.0E06
CHPAGMC (I-133)		
(PSCMLK)	1.2E09	1.1E10
(PSCOTH)	1.0E20	1.0E20
CHPAGLT (Sr-89)		
(GCMAXR)	8.3E05	1.8E08
CHPAGLT (Sr-90)		
(GCMAXR)	4.0E03	3.7E04
CHPAGLT (Cs-134)		
(GCMAXR)	1.1E05	4.1E06
CHPAGLT (Cs-137)		
(GCMAXR)	1.2E05	1.8E06
CHPAGLT (I-131)		
(GCMAXR)	2.1E07	1.0E20
CHPAGLT (I-133)		
(GCMAXR)	1.6E12	1.0E20

The CHRONC file differences between the MACCS Sample Problem A and the MACCS2 sample Problem A simply deal with the MACCS/MACCS2 transition and application of new features. There are negligible differences in the MACCS2/MACCS input files. They include:

- the food model switch (in MACCS2 the old MACCS food model is invoked)
- the manner in which the intermediate action time period is specified was changed for MACCS2, but both sample problems have no intermediate action time
- the time of the long-term exposure is set to the maximum value of 317 years in MACCS2, in MACCS it was hardwired at 1 million years