Hoi Yeung Wong - Monte Carlo Radiation Transport 2018/19 MCNP Assessment 3

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C \_\_\_\_Cells and importance \_\_\_\_

C Non-fissioning materials

1 1 -1.00 (11 -12 13 -14 15 -16) (36:(31 32 33 34 35)) imp:n=1 $ Water

2 2 -7.92 (21 -22 23 -24 25 -26) (-11:12:-13:14:-15) imp:n=1 $ SS Tank

3 3 -2.30 (41 -42 43 -44 45 -25) imp:n=1 $IMP:N=0.1 $ Concrete floor

C Fissioning materials

11 4 -19.2 (15 -36 -31) imp:n=1 $ cylinder (left)

12 4 -19.2 (15 -36 -32) imp:n=1 $ cylinder (right)

13 4 -19.2 (15 -36 -33) imp:n=1 $ cylinder (near side)

14 4 -19.2 (15 -36 -34) imp:n=1 $ cylinder (far side)

15 4 -19.2 (15 -36 -35) imp:n=1 $ cylinder (center)

C Voids:inside non-reentrant boundaries has imp:n>0

21 0 (11 -12 13 -14 16 -26) imp:n=1 $ void above water

22 0 (41 -42 43 -44 25 -26) (-21:22:-23:24) imp:n=1 $ void above concrete

C Voids:outside of non-reentrant boundary can have imp:n=0

23 0 (-41:42:-43:44:-45:26) imp:n=0

C \_\_\_\_ Surface definitions \_\_\_\_

C Wetted surfaces, and free surface of water.

11 PX -50.0 $ YZ face (left )

12 PX 50.0 $ YZ face (right)

13 PY -50.0 $ XZ face (near side)

14 PY 50.0 $ XZ face (far side)

15 PZ -29.8 $ Base (internal)

16 PZ 29.0 $ Water level

C Stainless steel tank exterior surface

21 PX -50.2 $ YZ face (left )

22 PX 50.2 $ YZ face (right)

23 PY -50.2 $ XZ face (near side)

24 PY 50.2 $ XZ face (far side)

25 PZ -30.0 $ Base (enternal)

26 PZ 30.0 $ Rim

C Cylinders of uranium (homogeneous U)

31 C/Z -20.0 0.0 7.50 $ cylinder (left)

32 C/Z 20.0 0.0 7.50 $ cylinder (right)

33 C/Z 0.0 -20.0 7.50 $ cylinder (near side)

34 C/Z 0.0 20.0 7.50 $ cylinder (far side)

35 CZ 7.5 $ cylinder (center)

36 PZ -4.8 $ Top of all cylinders

C Concrete floor

41 PX -80.2 $ extend 30cm further than the box in all directions

42 PX 80.2

43 PY -80.2

44 PY 80.2

45 PZ -80.0 $ 30cm below the depth

C \_\_\_\_Materials definitions\_\_\_\_

C Water, boronated

M1 1001.42c -0.111894 $ H-1 and mass fraction

8016.42c -0.888106 $ O-16 and mass fraction

5010.42c -0.0014 $ Addition of Boron

C The weight fraction above is not normalized;

C One should use table 40 to see the true wt. fraction of Boron added

C stainless steel, data retrieved from the endf92 database.

M2 24000.42c -0.18000 $ 18wt.% Cr

26000.42c -0.74000 $ 74wt.% Fe

28000.42c -0.08000 $ 8 wt.% Ni

C Concrete

M3 8016.42c -0.53 $ Oxygen

14000.42c -0.34 $ Silicon

20000.42c -0.10 $ Calcium

1001.42c -0.03 $ Hydrogen

C Uranium at 20-80 mix

M4 92235.42c -0.25

92238.42c -0.75

C \_\_\_\_Mode card\_\_\_\_

C Assume photoneutron production rate is negligible, so ignore photons

Mode N $ Importances has already been defined above

C \_\_\_\_Source definitions (in criticality mode)\_\_\_

KCODE 10000 1 100 500

KSRC -20 0 -17.3 20 0 -17.3 0 -20 -17.3 0 20 -17.3 0 0 -17.3

PRINT 40 175 126