5/21/99

A. Comparison w/ NUREG/CR-4982

Case 2 => TWOB.OUT

atmos 6b.inp
early 3.inp
chrnc 1_n.inp
" "
METSUR.INP
} TWOB.OUT

atmos 6c.inp → TWOC.OUT

Revise from Susquehanna power level back to Millstone 1 power level ⇒

atmos 6b.inp → atmos 6br.inp

atmos6 6r
early 3
chrnc1_n
" "
METSUR
} TWOBR.OUT

atmos 6cr → TWOCR.OUT

} This is Case 2r in my MACCS report

B. Comparison w/ NUREG/CR-6451

Need early fatalities at 50 miles for Case 3 =>

Case3 ≡ 7B.OUT, 7C_OUT, 7D.OUT

atmos 7b.inp
early 3.inp
chrnc 1_n.inp
METSUR.INP
" "
} 7B.OUT

So add output for early fatalities at 50 miles =>

early 3.inp → early 3e.inp

atmos 7b.inp
early 3e.inp
chrnc 1_n.inp
METSUR.INP
" "
} 7BE.OUT

Distance	Population
0-30 miles	1000 persons/mile^2
30-50 miles	city of 10 million, 280 persons/mile^2 elsewhere
50-500 miles	200 persons/mile^2

=> higher everything
maybe 18x higher within 50 miles
maybe 2x higher within 500 miles

Exclusion Area
.4 miles (.65 km) => lower prompt fatalities

Amount of decay
12 days => 50% higher prompt fatalities

Amount of long-lived isotopes
3x higher => up to 3x higher cancer fatalities and societal dose

Reactor Size
1150 MWe vs. Susquehanna ( ) prompt fatalities

πR^2

0-30 miles → $\pi (30 \text{ miles})^2 = 2827 \text{ miles}^2$

0-50 miles → $\pi (50 \text{ miles})^2 = 7854 \text{ miles}^2$

0-500 miles → $\pi (500 \text{ miles})^2 = 785{,}400 \text{ miles}^2$

0-30 miles $\quad 1000 \frac{\text{persons}}{\text{mile}^2} \times 2827 \text{ miles}^2 = 2.827 \times 10^6 \text{ persons}$

30-50 miles $\quad 280 \frac{\text{persons}}{\text{mile}^2} \times (7854 - 2827) \frac{\text{miles}^2}{} = 1.332 \times 10^6 \text{ persons}$

$+$ city of 10×10^6 persons

$$\frac{10 \times 10^6 + 1.332 \times 10^6 \text{ persons}}{7854 - 2827 \text{ miles}^2} = 2554 \frac{\text{persons}}{\text{mile}^2}$$

50-500 miles → $\frac{200 \text{ persons}}{\text{mile}^2} \cdot (785{,}400 - 7854) \text{ miles}^2 = 155 \times 10^6 \text{ persons}$

0-50 miles $\quad \frac{10 \times 10^6 + 1.332 \times 10^6 + 2.827 \times 10^6 \text{ persons}}{7854 \text{ miles}^2} = 1800 \frac{\text{persons}}{\text{mile}^2}$

0-500 miles^2 $\quad \frac{10 \times 10^6 + 1.332 \times 10^6 + 2.827 \times 10^6 + 155 \times 10^6}{785{,}400 \text{ mile}^2} = 215 \frac{\text{persons}}{\text{mile}^2}$

Societal Dose and Cancer Fatalities

Power correction of 3

atmos 76.inp → atmos 76r.inp

Population density of 1800 persons/mile²

early 3e → early 3ea.inp

Population density of 215 persons/mile²

early 3e → early 3eb.inp

Case 3ra:
- atmos 76r.inp
- early 3ea.inp
- chrnc1_n
- " "
- METSUR

→ 7BRA.OUT

Case 3rb:
- atmos 76r.inp
- early 3eb.inp
- chrnc1_n
- " "
- METSUR

→ 7BRB.OUT

Case 3ra

Societal Dose	0-50 miles	389,000
Cancer Fatalities	0-5 miles	20,800

Case 3rb

Societal Dose	0-50 miles	57,900
	0-500 miles	994,000
Cancer Fatalities	0-50 miles	3,050
	0-500 miles	44,900

Overall

Societal Dose 0-50 miles → 389,000

0-500 miles → 389,000 + (994,000 - 57,900)

= 1,330,000

Cancer Fatalities 0-50 miles → 20,800

0-500 miles → 20,800 + (44,900 - 3,100)

= 62,600

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Prompt Fatalities's

Excl. Area	Pop. Density	Power Cor	Files	Early Fatalities 0-30	Early Fatalities 0-500
0	1800 p/mi²	3	atmos 7br, early 3ea, 7bra.out	785	785
.32	1800 p/mi²	3	atmos 7br, early 3ec, 7brc.out	751	751
.32	1000 p/mi²	3	atmos 7br, early 3ed, 7brd.out	417	417
.32	1000 p/mi²	1.8	atmos 7bs, early 3ed, 7bsd.out	186	186
.75	1000 p/mi²	1.8	atmos 7bs, early 3ee, 7bse.out	159	159
.32	1000 p/mi²	1.7	atmos 7bt, early 3ed, 7btd.out	168	168
0	1000 p/mi²	1.7	atmos 7bt, early 3ef 7btf.out	183	183

Power Correction

Millstone 1 is 2006 MWt / 654 MWe

NUREG/CR-6451 is 1155 MWe

=> Power Correction is $\frac{1155}{654} = 1.8$

Exclusion Area

NUREG/CR-6451 is .4 miles

	km	miles
1 →	.0	0
3 →	.52	.32
4 →	1.21	.75