Appendix 12A. Tables

Table 12-1. Design Basis Source Strengths for Fluids

		Gamma Groups					
Source Designation		1	2	3	4	5	6
A.	Reactor coolant, high temperature, fission and corrosion products						
	SS	3.44 E + 6	4.76 E + 5	4.79 E + 5	1.33 E + 5	1.14 E + 5	1.26 E + 4
	E	.10	.476	.898	1.33	2.12	2.71
B.	Reactor coolant, nitrogen-16 term (per microcurie/cc)						
	SS	-----	-----	-----	3.70 E + 2	2.55 E + 4	1.85 E + 3
	E	-----	-----	-----	2.75	6.13	7.12
C.	Reactor coolant, pressure						
	SS	1.33 E + 6	1.77 E+5	2.63 E + 5	3.33 E + 4	7.49 E + 2	6.76 E + 1
	E	.167	.471	.890	1.26	1.83	2.55
D.	Reactor coolant, ambient temperature						
	SS	4.86 E + 6	6.73 E + 5	6.77 E + 5	1.89 E + 5	1.61 E + 5	1.78 E + 4
	E	.100	.476	.898	1.33	2.12	2.71
E.	Reactor coolant, downstream mixed - bed demineralizer						
	SS	4.58 E + 6	2.96 E + 5	2.89 E + 5	5.18 E + 4	1.27 E + 5	1.19 E + 4
	E	.0958	.448	.902	1.33	2.19	2.68
F.	Reactor coolant, downstream mixed –bed and cation-bed demineralizer						
	SS	4.57 E+6	2.86 E+5	2.67 E+4	4.84 E+5	1.25 E+5	1.1 E + 4
	E	.0956	.446	.902	1.33	2.2	2.67
G.	Reactor coolant, demineralized, gas-stripped (volume control tank)						
	SS	3.41 E+6	2.14 E+5	2.52 E+5	4.67 E+4	7.38 E+4	7.24 E+3
	E	.094	.449	.902	1.33	2.19	2.72
H.	Reactor coolant, fully degassed						
	SS	3.70 E+5	5.14 E+5	6.45 E+5	1.85 E+5	5.69 E+4	1.09 E+4
	E	.171	.493	.897	1.33	1.88	2.79
I.	Reactor coolant, degassed, diluted with other leakage (factor = 1/50)						
	SS	7.40 E+3	1.02 E+3	1.29 E+4	3.70 E+3	1.13 E+3	2.18 E+2
	E	.171	.493	.897	1.33	1.88	2.79
J.	Reactor coolant, degassed, evaporated (DF=1000)						
	SS	3.7 E+2	5.14 E+2	6.45 E+2	1.85 E+2	5.69 E+1	1.09 E+1
	E	.171	.493	.897	1.33	1.88	2.79

		Gamma Groups					
Source Designation		1	2	3	4	5	6
K.	Reactor coolant, residual heat removal mode						
	SS	4.35 E+6	4.50 E+5	4.73 E+5	1.07 E+5	3.94 E+4	1.15 E+3
	E	.096	.462	.869	1.29	2.21	2.52
L.	Evaporator concentrates (non-recyclable)						
	SS	1.81 E+6	1.56 E+6	1.95 E+6	2.78 E+5	3.22 E+3	1.68 E+2
	E	.159	.493	.889	1.26	1.84	2.42
M.	Demineralizer resins (combined no sluice water)						
	SS	6.76 E+8	5.82 E+9	5.54 E+9	3.04 E+8	1.5 E+6	1.28 E+5
	E	.167	.573	.830	1.30	1.82	2.54
N.	Demineralizer resins (combined, 6 mo. Decay, no sluice water)						
	SS	6.37 E+7	2.04 E+9	1.05 E+9	3.67 E+7	1.56 E+3	6.69 E-1
	E	0.33	.621	.807	1.36	2.19	2.55
O.	Waste gas tank (maximum)						
	SS	5.45 E+7	1.55 E+6	1.79 E+4	1.54 +3	5.95 E+4	1.31 E+3
	E	.084	.434	.896	1.50	2.29	2.59

Notes:

1. SS = Source Strength in gammas/cc-sec
2. E = Average energy in MeV
3. 1.10 E+6 means 1.10 x 10^6

Table 12-2. Design Basis Source Strengths for Demineralizers Estimated Source Strengths (MeV/cc-sec) & Energies (MeV/gamma)

Demineralizer (In Place)	.2-.4	.4-.9	.9-1.35	1.35-1.8	1.8-2.2	2.2-2.6	2.6-3.0	3.0-4.0
Mixed Bed	1.8E8	7.7E8	7.7E7	2.6E7	1.4E6	8.4E5	1.9E5	5.7E4
Cation Bed	7.5E6	6.5E8	4.3E7	1.5E7	5.5E5	1.9E5	1.9E5	4.4E4
Recycle Evaporator Feed	8.9E6	3.8E8	4.2E7	8.9E6	2.8E4	2.1E4		
Boron Thermal Regeneration	2.7E6	1.8E6	4.4E5	2.4E5	2.1E4	1.4E4		
Spent Fuel Pool	1.0E4	6.5E5	3.0E5	5.9E3				
Recycle Evaporator Condensate	3.4E4	2.2E4	4.2E3	2.0E3	1.8E2	1.2E2		
Waste Evaporator Condensate	3.2E5	6.1E5	1.8E5	2.6E4	1.7E3	1.1E3		
Waste Monitor Tank	2.5E6	1.5E7	6.6E6	9.1E5	7.9E4	4.0E4		
S.G. Blowdown Recycle	1.3E6	1.3E8	8.0E6	3.1E6	8.5E3	2.3E3		

Table 12-3. Design Basis Source Strengths for Filters Estimated Source Strengths (MeV/cc-sec) & Energies (MeV/gamma)

Filter	.2-.4	.4-.9	.9-1.35	1.35-1.8	1.8-2.2	2.2-2.6
Recycle Evaporator Condensate	3.4E4	2.2E4	4.2E3	2.0E3	1.8E2	1.2E2
Recycle Evaporator Concentrate	1.6E5	8.4E5	3.7E5	4.5E4	3.5E3	2.0E3
Waste Evaporator Condensate	3.2E5	6.1E5	1.8E5	2.6E4	1.7E3	1.1E3
Boric Acid	1.6E5	8.4E5	3.7E5	4.5E4	3.5E3	2.0E3
Reactor Coolant	-	5.7E7	1.5E7	-	-	-
Seal Water Injection	-	4.8E7	1.2E7	-	-	-
Spent Fuel Pool (Pre & Post)	-	1.1E7	3.0E6	-	-	-
Seal Water Return	-	1.1E7	3.0E6	-	-	-
Recycle Evaporator Feed	-	1.1E7	3.0E6	-	-	-
Spent Resin Sluice	-	1.1E7	3.0E6	-	-	-
Spent Fuel Pool Skimmer	-	1.1E7	3.0E6	-	-	-
Waste Monitor Tank Waste Evaporator Feed Floor Drain Tank Laundry & Hot Shower Tank (primary & secondary carbon)	-	3.4E7	8.9E6	-	-	-

Table 12-4. Reactor Coolant System Nitrogen-16 Activity

Component	N-16 μCi/gm
Reactor Vessel, Core	95
Reactor Vessel, Upper Region	125
Reactor Vessel Outlet	113
Steam Generator	92
Reactor Coolant Pump	69
Reactor Vessel Inlet	65

Table 12-5. Fluxes on Inside Surface of Primary Concrete

Energy Group	Neutron Flux (cm^{-2}- sec^{-1})
E J 1 MeV	7.6 E+8
5.53 keV < E ≤ 1.0 MeV	1.2 E+10
0.625eV ≤ E ≤ 5.53 keV	7.1 E+9
E < 0.625ev	1.8 E+9
Energy (MeV)	**Gamma Flux (cm^{-2}- sec $^{-1}$)**
7.5	4.9 E+8
4.0	8.2 E+8
2.5	6.8 E+8
0.8	1.2 E+8

Table 12-6. Design Source Strengths for Outside Storage Tanks

Steam Generator Drain Tank:						
SS	2.03 E + 5	2.82 E+5	3.54 E+5	1.01 E+5	3.12 E+4	5.99 E+3
E	.171	.493	.897	1.33	2.19	2.72
Refueling Water Storage Tank:						
SS	3.06 E+1	9.59 E+1	1.29 E+1	1.09 E+1		
E	.151	.553	.884	1.25		
Reactor Makeup Water Storage Tank						
SS	4.34 E+1	3.74 E+1	4.68 E+1	6.67 E+0		
E	.159	.493	.889	1.26		

Notes:

1. 1.1E+6 = 1.10×10^6
2. SS= Source Strength in gammas/cc-sec
3. E= Average energy in MeV

Table 12-7. Spent Fuel Source Term - (MeV/cc - sec). Time After Shutdown

Energy (MeV)	4 Hours	12 Hours	1 Day	1 Week	1 Month	3 Months
0.4	3.1 E+11	2.3 E+11	1.9 E+11	9.2 E+10	3.8 E+10	1.3 E+10
0.8	1.3 E+12	9.8 E+11	8.0 E+11	4.0 E+11	2.3 E+11	1.2 E+11
1.3	3.9 E+11	2.9 E+11	2.5 E+11	1.6 E+11	1.2 E+11	5.8 E+10
1.7	5.1 E+11	3.8 E+11	3.3 E+11	2.3 E+11	6.2 E+10	2.9 E+9
2.2	7.2 E+10	2.6 E+10	1.5 E+10	8.5 E+9	6.7 E+9	5.0 E+9
2.5	8.9 E+10	4.7 E+10	3.7 E+10	2.5 E+10	7.9 E+9	3.5 E+8
3.5	8.2 E+9	2.0 E+9	1.3 E+9	9.6 E+8	2.0 E+8	1.5 E+7

Note:

1. 1.10E+6 = 1.10×10^6

Table 12-8. Source Terms for Calculating Airborne Radioactivity in Auxiliary Building Cubicles

Area	Source Term (%)[1]
543' level	
Seal Water HX Room	1
Mechanical Penetration Room	2
Recycle Evaporator Feed Pump Room	5
Recycle Evaporator Package Room	10
Centrifugal Charging Pump Rooms	5
Reciprocal Charging Pump Room	30
Waste Gas Compressor Rooms	5
560' level	
Seal Water Injection Filter Rooms	2
Seal Water Return Filter Room	1
Reactor Coolant Filter Rooms	1
Recycle Evaporator Feed Filter Rooms	1
Cation Bed Demineralizer Room	1
Mixed Bed Demineralizer Rooms	1
Recycle Evaporator Feed Demineralizer Rooms	1
577' level	
Letdown Reheat HX Room	5
Letdown Chiller HX Room	2
Moderating HX Room	2
Letdown HX Room	4
Mechanical Penetration Room	5

Note:

1. Source terms are expressed as a percent Table 11-14 Auxiliary Building releases.

Table 12-9. Concentration Estimates of Airborne Radioactivity in Auxiliary Building Cubicles (μCi/ml)

Isotope	Seal Water HX (1 Unit)	Mechanical Penetration (El. 543') (1 Unit)	Recycle Evap. Feed Pump (2 Units)	Recycle Evap. Package (2 Units)
Kr-85m	3.0E-9	5.9E-10	1.0E-7	2.4E-8
Kr-87	1.8E-9	3.5E-10	6.0E-8	1.4E-8
Kr-88	5.6E-9	1.1E-9	1.9E-7	4.4E-8
Xe-133m	2.7E-9	5.3E-10	9.0E-8	2.0E-8
Xe-133	1.3E-7	2.6E-8	4.4E-6	1.0E-6
Xe-135	8.4E-9	1.6E-9	2.7E-7	6.4E-8
Xe-138	1.3E-9	2.6E-10	4.4E-8	1.0E-8
I-131	5.0E-12	1.0E-12	1.7E-10	3.9E-11
I-133	7.6E-12	1.5E-12	2.6E-10	5.8E-11
Mn-54	2.2E-13	4.4E-14	7.5E-12	1.7E-12
Fe-59	6.7E-14	1.3E-14	2.2E-12	5.2E-13
Co-58	4.5E-13	8.8E-14	1.5E-11	3.4E-12
Co-60	3.4E-13	6.6E-14	1.1E-11	2.6E-12
Sr-89	1.5E-14	2.9E-15	4.8E-13	1.1E-13
Sr-90	2.7E-15	5.3E-16	9.0E-14	2.1E-14
Cs-134	2.0E-13	3.95E-14	6.8E-12	1.6E-12
Cs-137	3.4E-13	6.6E-14	1.1E-11	2.6E-12
Fraction of 10CFR20 Restricted Area DAC	.006	.0035	.207	.048

Isotope	Centri. Charging Pump	Reciprocal Charging Pump	Seal Water Inject. Filter	Seal Water Return Filter
Kr-85m	2.6E-8	2.6E-7	7.2E-8	6.0E-8
Kr-87	1.5E-8	1.5E-7	4.3E-8	3.6E-8
Kr-88	4.8E-8	4.8E-7	1.3E-7	1.1E-7
Xe-133m	2.3E-8	2.3E-7	6.4E-8	5.4E-8
Xe-133	1.2E-6	1.2E-5	3.2E-6	2.7E-6
Xe-135	7.2E-8	7.2E-7	2.0E-7	1.7E-7
Xe-138	1.2E-8	1.2E-7	3.2E-8	2.7E-8
I-131	4.3E-11	4.3E-10	1.2E-10	1.0E-10
I-133	6.5E-11	6.5E-10	1.8E-10	1.5E-10
Mn-54	1.9E-12	1.9E-11	5.4E-12	4.5E-12
Fe-59	5.8E-13	5.8E-12	1.6E-12	1.3E-12
Co-58	3.8E-12	3.8E-11	1.1E-11	8.9E-12
Co-60	2.9E-12	2.9E-11	8.1E-12	6.7E-12
Sr-89	1.2E-13	1.2E-12	3.5E-13	2.9E-13
Sr-90	2.3E-14	2.3E-13	6.4E-14	5.4E-14
Cs-134	1.7E-12	1.7E-11	4.8E-12	4.0E-12
Cs-137	2.9E-12	2.9E-11	8.1E-12	6.7E-12
Fraction of 10CFR20 Restricted Area DAC	.054	.807	.146	.123

Isotope	**Reactor Coolant Filter**	**Recycle Evap. Feed Filter**	**Cation Bed Demin.**	**Mixed Bed Demin.**	
				1A /	**1B**
Kr-85m	7.2E-8	9.0E-8	4.5E-8	6.0E-8	4.0E-8
Kr-87	4.3E-8	5.4E-8	2.7E-8	3.6E-8	2.4E-8
Kr-88	1.3E-7	1.7E-7	8.4E-8	1.1E-7	7.5E-8
Xe-133m	6.4E-8	8.1E-8	4.0E-8	5.4E-8	3.6E-8
Xe-133	3.2E-6	4.0E-6	2.0E-6	2.7E-6	1.8E-6
Xe-135	2.0E-7	2.5E-7	1.3E-7	1.7E-7	1.1E-7
Xe-138	3.2E-8	4.0E-8	2.0E-8	2.7E-8	1.8E-8
I-131	1.2E-10	1.5E-10	7.6E-11	1.0E-10	6.7E-11
I-133	1.8E-10	2.3E-10	1.1E-10	1.5E-10	1.0E-10
Mn-54	5.4E-12	6.7E-12	3.4E-12	4.5E-12	3.0E-12
Fe-59	1.6E-12	2.0E-12	1.0E-12	1.4E-12	9.0E-13
Co-58	1.1E-11	1.3E-11	6.7E-12	9.0E-12	6.0E-12
Co-60	8.1E-12	1.0E-11	5.0E-12	6.8E-12	4.5E-12
Sr-89	3.5E-13	4.4E-13	2.2E-13	2.9E-13	1.9E-13
Sr-90	6.4E-14	8.1E-14	4.0E-14	5.4E-14	3.6E-14
Cs-134	4.8E-12	6.0E-12	3.0E-12	4.1E-12	2.7E-12
Cs-137	8.1E-12	1.0E-11	5.0E-12	6.8E-12	4.5E-12
Fraction of 10CFR20 Restricted Area DAC	.141	.186	.093.	.123	.083

Isotope	Recycle Evap. Feed Demin. 1A	/ 1B	Letdown Reheat HX	Letdown Chiller HX	Waste Gas Comp.
Kr-85m	5.2E-8	3.7E-8	9.1E-8	3.6E-8	1.4E-8
Kr-87	3.1E-8	2.2E-8	5.4E-8	2.1E-8	8.2E-9
Kr-88	9.6E-8	6.9E-8	1.7E-7	6.7E-8	2.6E-8
Xe-133m	4.6E-8	3.3E-8	8.1E-8	3.2E-8	1.24E-8
Xe-133	2.3E-6	1.6E-6	4.0E-6	1.6E-6	6.2E-7
Xe-135	1.4E-7	1.0E-7	2.5E-7	1.0E-7	3.9E-8
Xe-138	2.3E-8	1.6E-8	4.0E-8	1.6E-8	6.2E-9
I-131	8.6E-11	6.1E-11	1.5E-10	6.0E-11	2.3E-11
I-133	1.3E-10	9.3E-11	2.3E-10	9.1E-11	3.5E-11
Mn-54	3.4E-12	2.4E-12	6.4E-12	2.7E-12	1.0E-12
Fe-59	1.2E-12	8.6E-13	2.0E-12	8.1E-13	3.1E-13
Co-58	7.7E-12	5.5E-12	1.3E-11	5.4E-12	2.1E-12
Co-60	5.8E-12	4.1E-12	1.0E-11	4.0E-12	1.5E-12
Sr-89	2.5E-13	1.8E-13	4.4E-13	1.7E-13	6.7E-14
Sr-90	4.6E-14	3.3E-14	8.1E-14	3.2E-14	1.2E-15
Cs-134	3.5E-12	2.5E-12	6.0E-12	2.4E-12	9.3E-13
Cs-137	5.8E-12	4.1E-12	1.0E-11	4.0E-12	1.5E-12
Fraction of 10CFR20 Restricted Area DAC	.106	.075	.187	.074	.029

Isotope	Moderating HX	Letdown HX	Mechanical Penetration	Other Areas
			(El. 577')	
Kr-85m	3.6E-8	9.5E-9	4.3E-9	4.2E-10
Kr-87	2.1E-8	5.7E-9	2.5E-9	2.5E-10
Kr-88	6.7E-8	1.8E-8	8.0E-9	7.8E-10
Xe-133m	3.2E-8	8.5E-9	3.8E-9	3.8E-10
Xe-133	1.6E-6	4.2E-7	1.9E-7	1.9E-8
Xe-135	1.0E-7	2.6E-8	1.2E-8	1.2E-9
Xe-138	1.6E-8	4.2E-9	1.9E-9	1.9E-10
I-131	6.0E-11	1.6E-11	7.1E-12	7.1E-13
I-133	9.1E-11	2.4E-11	1.1E-11	1.1E-12
Mn-54	2.7E-12	7.1E-13	3.2E-13	3.1E-14
Fe-59	8.1E-13	2.1E-13	9.5E-14	9.4E-15
Co-58	5.4E-12	1.4E-12	6.4E-13	6.3E-14
Co-60	4.0E-12	1.1E-12	4.8E-13	4.7E-14
Sr-89	1.7E-13	4.6E-14	2.1E-14	2.0E-15
Sr-90	3.2E-14	8.5E-15	3.8E-15	3.8E-16
Cs-134	2.4E-12	6.4E-13	2.9E-13	2.8E-14
Cs-137	4.0E-12	1.1E-12	4.8E-13	4.7E-14
Fraction of 10CFR20 Restricted Area DAC	.074	.019	.009	.001

Table 12-10. Concentration Estimates of Airborne Radioactivity in Turbine Building

Isotope	Concentration (µCi/ml)
Kr-83m	8.2E-14
Kr-85m	8.7E-13
Kr-85	4.6E-11
Kr-87	2.4E-13
Kr-88	1.5E-12
Kr-89	2.2E-14
Xe-131m	1.7E-12
Xe-133m	2.7E-12
Xe-133	2.3E-10
Xe-135m	5.5E-14
Xe-135	3.1E-12
Xe-137	3.8E-14
Xe-138	1.8E-13
I-131	2.8E-14
I-133	3.7E-14
H-3	1.5E-10
Fraction of 10CFR20 Unrestricted Area DAC	1.4E-5

Table 12-11. Concentration Estimates of Airborne Radioactivity in Upper Containment During Operation

Isotope	Concentration (μCi/ml)
Kr-83m	5.0E-9
Kr-85m	1.3E-7
Kr-85	1.1E-5
Kr-87	6.5E-9
Kr-88	1.0E-7
Kr-89	1.1E-12
Xe-131m	1.0E-5
Xe-133m	1.0E-5
Xe-133	1.4E-3
Xe-135m	6.7E-11
Xe-135	1.5E-6
Xe-137	2.8E-12
Xe-138	1.7E-10
I-131	8.4E-9
I-133	2.0E-9
Ar-41	4.2E-5
H-3	2.3E-6
Fraction of 10CFR20 Restricted Area DAC	30
H-3 (during refueling)	1.2E-6

Table 12-12. Concentration Estimates of Airborne Radioactivity in the Administration Building

Isotope	Concentration (μCi/ml)
Kr-83m	5.1E-15
Kr-85m	5.5E-14
Kr-85	3.0E-12
Kr-87	1.5E-14
Kr-88	9.2E-14
Kr-89	1.4E-15
Xe-131m	1.1E-13
Xe-133m	1.7E-13
Xe-133	1.5E-11
Xe-135m	3.4E-15
Xe-135	1.9E-13
Xe-137	2.4E-15
Xe-138	1.1E-14
I-131	1.5E-16
I-133	7.8E-16
H-3	9.4E-12
Fraction of 10CFR20 Unrestricted Area DAC	7.8E-7

Table 12-13. Concentration Estimates of Airborne Radioactivity in the Control Room

Isotope	Concentration (µCi/ml)
Kr-83m	1.1E-13
Kr-85m	1.2E-12
Kr-85	6.3E-11
Kr-87	3.2E-13
Kr-88	2.0E-12
Kr-89	2.9E-14
Xe-131m	2.3E-12
Xe-133m	3.7E-12
Xe-133	3.2E-10
Xe-135m	7.3E-14
Xe-135	4.1E-12
Xe-137	5.1E-14
Xe-138	2.4E-13
I-131	3.2E-15
I-133	2.9E-15
H-3	2.0E-10
Fraction of 10CFR20 Restricted Area DAC	1.7E-5

Table 12-14. Concentration Estimates of Airborne Radioactivity in Fuel Handling Area

Isotope	Concentration (μCi/ml)
Kr-83m	8.5E-14
Kr-85m	9.1E-13
Kr-85	4.9E-11
Kr-87	2.5E-13
Kr-88	1.5E-12
Kr-89	2.3E-14
Xe-131m	1.8E-12
Xe-133m	2.8E-12
Xe-133	2.5E-10
Xe-135m	5.7E-14
Xe-135	3.2E-12
Xe-137	4.0E-14
Xe-138	1.9E-13
I-131	2.5E-15
I-133	2.3E-15
H-3	1.4E-6
Fraction of 10CFR20 Restricted Area DAC	.07

Table 12-15. Design Radiation Zones

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Zone	*Dose Rate Limit[1] (mrem/hr)*	*Occupancy*	*Examples*
I	*2.0*	*Continuous*	*-Offsite areas*
II	*0.5*	*Continuous*	*-Control Room* *-Yard* *-Service Building* *-Turbine Building*
III	*1.0*	*Extended*	*-Cable Room* *-Battery Room* *-Electrical Penetrations*
IV	*2.5*	*Periodic*	*-Aux. Building Corridors* *-Spent Fuel Pool Surface*
V	*15.*	*Intermittent*	*-Incore Instrument Room* *-Pipe Tunnel Cover*
VI	*15. - 100*	*Infrequent*	*-Demineralizer Rooms* *-Filter Rooms*
VII	*>100*	*Infrequent*	*-Spent Resin Rooms* *-NC Filter Rooms* *-Evaporator Concentrate.*

Note:

1. *For anticipated operational occurrences*

Table 12-16. Present W E-Specs On Cobalt Content of Materials

	Weight Percent Cobalt
Reactor Internals (SS)	0.12 maximum
Reactor Vessel Clad (SS)	0.2 maximum
RCS Piping (SS)	0.2 maximum
Reactor Internal Bolting Materials (SS)	0.25 maximum
RCS Pumps (SS)	0.2 maximum
Auxiliary HX Surfaces Exposed to RCS (SS)	0.2 maximum
Steam Generators (Inconel)	0.1 maximum(Unit 2)
Fuel (SS)[2]	0.12 maximum
Fuel (SS)	0.08 maximum
Fuel (Inconel)	0.1 maximum
Fuel (Zircaloy)	0.002 maximum

Notes:

1. SS = Stainless Steel
2. Refers to stainless steel outside active region on zircaloy clad fuel (e.g. top and bottom nozzles)
3. Refers to stainless steel inside active region

Table 12-17. Catawba Radiation Zones - Reactor Building

		Radiation Zone[2]		Accessible		
Figure	Location[1]	Design Operation	Refueling/Shutdown	At Power	Shutdown	Special Considerations
12-1	1. Incore Tunnel	VII	VII	No	No	Accessible only when thimbles are in core and prior to flux mapping process.
12-2	2. Inside Cranewall	VII	VII	Very Limited	No	Radiation levels will greatly limit shutdown access.
	3. Outside Cranewall - pipe tunnel area	VII	VI	Very Limited	Yes	Letdown, charging, seal water, and RHR piping in tunnel.
	4. Annulus	VII	V	Limited	Yes	
12-3	5. Inside Cranewall	VII	Varies from VI to VII	Very Limited	Limited	Radiation levels will remain high during shutdown due to corrosion products.
	6. Accumulator Tank	VII	VII	Very Limited	Limited	
	7. Refueling Canal	VII	VII	Limited	Limited	
	8. Outside Cranewall	VI	VI	Limited	Limited	
	9. Regenerative and Excess Letdown Hx Rooms 116°	VII	VI	No	Limited	Radiation levels will remain high due to Corrosion Products.

		Radiation Zone[2]		Accessible		
Figure	**Location[1]**	**Design Operation**	**Refueling/Shutdown**	**At Power**	**Shutdown**	**Special Considerations**
	10. Annulus	VII	V	Limited	Yes	
12-4	11. Steam Generator Area	VII	VII	Very Limited	Limited	
	12. Pressurizer Area	VII	VII	Very Limited	Limited	
	13. Inside Cranewall	VII	VII	Very Limited	Limited	
	14. Refueling Canal	VII	VII	Limited	Limited	
	15. Reactor Vessel Area	VII	VII	No	Very Limited	
	16. Outside Cranewall	VII	VI	Limited	Yes	
	17. Annulus	VII	V	Limited	Yes	
12-5	18. Operating Level Reactor Vessel Area	VI	V	Limited	Yes	
	19. Reactor Internals Stand Area	VI	V	Limited	Yes	
	20. Steam Generator	VII	VII	Very Limited	Limited	

		Radiation Zone[2]		Accessible		
Figure	**Location[1]**	**Design Operation**	**Refueling/Shutdown**	**At Power**	**Shutdown**	**Special Considerations**
	21. Pressurizer Area	VII	VI	Very Limited	Limited	
	22. Outside Cranewall	VI	V	Limited	Yes	
	23. Inside Cranewall Operating Floor	VII	VI	Limited	Limited	
12-5	24. Annulus	VI	V	Limited	Yes	
12-6	25. Top of Steam Generator	VII	VI	Limited	Yes	
	26. Above Control Rod Drive Shield	VII	V	Limited	Yes	
	27. Outside Cranewall	VI	V	Limited	Yes	
	28. Annulus	VI	V	Limited	Yes	
12-7	29. Inside Containment Above Cranewall	V	IV	Limited	Yes	
	30. Annulus	VI	V	Limited	Yes	
12-8	1. Inside Cranewall	VII	VI to VII	Very Limited	Limited	

Figure	Location[1]	Radiation Zone[2] Design Operation	Radiation Zone[2] Refueling/Shutdown	Accessible At Power	Accessible Shutdown	Special Considerations
	2. Incore Tunnel	VII	VII	No	No	Access controlled by location of thimbles and incore detectors along with guide tube leakage.
	3. Pipe Tunnel EL. 552+0	VII	VI	Very Limited	Yes	Letdown, charging, seal water, and RHR Piping in tunnel.
	4. Incore Inst. Rm.	V	V	Limited	Yes	
	5. Reactor Coolant Drain Tank Area EL. 552+0	VII	VII	Very Limited	Limited	
12-8	6. Equipment Compartment s Outside Cranewall	Varies from V to VII (See plan views)		Limited	Yes	
	7. Above Operating Floor	VI	V	Limited	Yes	
	8. Upper Building section	V	IV	Limited	Yes	

Notes:

1. Location numbering corresponds to that on drawings.
2. Reference Table 12-15 for definition.

Table 12-18. Catawba Radiation Zones - Auxiliary Building

		Radiation Zone[2]		Accessible	
Figure	Location[1]	Design Operation	Refueling/ Shutdown	At Power	Special Considerations
12-9	1. Residual Heat Removal Pump Rooms 53-54 FF-HH	VI	VI	Limited (not during refueling)	Corrosion product buildup on pump and piping is significant.
	2. CS Pump Rooms 54-56 FF-HH	IV	IV	Yes	Manual controls necessary should be outside of rooms.
	3. Corridors	IV	IV	Yes	CS Piping crosses corridor.
	4. Covered Trench 56 FF-HH	V	VI	Yes	Trench may be crossed to access controls in corridor. (Carries ND piping).
	5. Chemical Drain Tk Room and Gas Decay Tk Pump Rooms	VI	VI	No	
	6. Hot Side of Recycle Evap. Skid 55-57	VII	VII	No	No access while Evap. Operating.
	7. Entrance to Recycle Evap. Skid 55-57	V	V	Yes	Short term access while Evap. Operating, Concentrates transfer pump and heat exchanger operation may affect accessibility.
12-10	Refer to Figure 12-9 for similar area zoning				
12-11	Refer to for Figure 12-12 similar area zoning.				

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
12-12	1. Mechanical Penetration Area 51-53 GG-KK	VII	VI	Very Limited	Possible Airborne Contamination-High-maintenance equipment should not be located here.
	2. Mechanical Penetration Area 52-53 GG-KK	VI	VI	Limited	RHR Lines during refueling.
	3. Mechanical Penetration Area 50 KK	VI	V	Limited	
	4. Hot Skid of Waste Evap. 52 KK-MM	VII	VII	No	Process controlled.
	5. Entrance to Waste Evap.	V	V	Limited	Concentrates transfer pump and heat exchanger operation may affect accessibility.
	6. Recycle Holdup Tk Rooms 51-55 NN-QQ	VII	VII	No	No manually operated controls in room.
	7. Waste Evap. Feed Tk. Room 52-53 KK-LL	VII	VII	No	No manually operated controls in room.
	8. Waste Drain Tk. Room 52-54 KK-LL	VII	VII	No	No manaully operated controls in room.
	9. Pump Rooms 52-54 LL-MM	VI	VI	Limited	Located for valve bodies. Maintenance considerations are important.

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
	10. Charging Pump Rooms 53-54 JJ-JJ 54 56 HH-KK	VII	VII	Only when drained for repair	Safety Injection piping in Recip. Charging Pump Room.
	11. S.I. Pump Rooms 53-54 GG-JJ	IV	IV	Yes	(Used for initial high pressure injection from RWST and for recirculation later).
	12. Sample Hx Area 53 EE-FF	VI	VI	Limited	Corrosion Produts add significantly to radiation levels.
	13. Accident Sample Panel Area 53-54 EE-FF	VI	VI	Limited	Normal operation dead legs located in in this area.
	14. Pipe Trench 55-58 KK	V	V	Yes	Radioactive piping in trench.
	15. Recycle Evap. Feed Pump and Valve Rooms 55-57 PP-QQ	VI	VI	Limited	Design for maintenance considerations.
	16. Valve Operator Area	IV	IV	Yes	Contains controls for valve operations to reduce radiation exposures.
	17. Corridor Areas	IV	IV	Yes	
12-13	1. Mechanical Penetration Area 61-64 GG-KK	VII	VI	Very Limited	Possible Airborne Contamination. High maintenance equipment should not be located here.

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
	2. Mechanical Penetration Area 61-62 EE-GG	VI	V	Limited	Accident recirculation lines in area.
	3. Mechanical Penetration Area	VI	V	Limited	
	4. Waste Gas Decay Tk. Room 59-63 NC-QQ	VII	VII	No	No controls should be in area.
	5. Waste Gas Valve Area 59-60 NN-QQ	VII	VII	Limited	Access for maintenance.
	6. Gas Anal. Rack-A Room 59-60 MM-NN	V	V		Processing controls radiation levels
	7. Hydrogen Recombiner Room 60-61 MM-NN	VI	VI	No	Access limited due to operation of recombiner and WG piping in trench.
	8. Gas Anal. Rack-B 60-61 MM-NN	VI	VI		Processing controls access. WG piping in trench limits access.
	9. Hydrogen Recomb. Room 61-62 MM-NN	VI	VI	No	Limited access when recombiner not opening.
	10. Waste Gas	VII	VII	No	Serves both Units

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
	Compressor Room 61-62 MM-NN				
	11. Waste Gas Compressor Room 62-63 MM-NN	VII	VII	No	Serves both Units.
	12. LHST Pump Room 63 LL-MM	V	V	Limited	
	13. FDT Pump Room 63 KK-LL	VI	VI	Limited	
	14. FDT & LHST Room	VI	VI	Limited	
	15. Spent Resin Sluice Pump Room 61-62 LL-MM	VI	VI		Accessible when isolated from SRST
	16. SRST rooms 59-62 KK-MM	VII	VII	No	No valve or operators should be placed in rooms
	17. SR Valve Room 59-60 LL-MM	VII	VII		Limited accessibility when resins are not being handled.
	18. Mixing and Settling Tank Room 59 KK-LL	VI	VI	No	Radiation levels vary dependent on material processed.

Figure	Location[1]	Radiation Zone[2] Design Operation	Radiation Zone[2] Refueling/ Shutdown	Accessible At Power	Special Considerations
	19. Mixing And Settling Tank Room 59 KK-LL	VI	VI	No	Radiation levels vary dependent on material processed.
	20. Charging Pump Rooms 58-61 HH-KK	VII	VII	No	Limited access when not in service.
	21. Safety Injection Pump Rooms 60-61 GG-JJ	IV	IV	Yes	
	22. Sample Hx Area 61 EE-FF	VI	VI	Limited	Corrosion add significantly to radiation level.
	23. Accident Sample Panel 60 EE-FF	VI	VI	Limited	Normal operation dead legs located in this area.
	24. Corridor Area	IV	IV	Yes	
12-14	1. Auxilliary Feedwater Pump Area 49-53, 61-65, AA-DD	III	III	Yes	
12-15	Refer to Figure 12-16 for similar zoning.				
12-16	1. Mechanical Penetration Area 50-53 EE-KK	VII	VII	Very Limited	NV piping in area of VCT makes this a high radiation area.

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
	2. Entrance to MPA 53-54 EE-FF	V	V	Limited	
	3. Corridor Section in MPA & NV Valve Bodyarea 51 KK-MM + 53 KK-MM	V	VI	Limited	RHR piping in area for shutdown cooling. Access depedent on resin sluice operations.
	4. RHR & CS 11x Rooms 51-52 KK-MM	VII	VII	No	Corrosion Product buildup important.
	5. Valve Body Room 51-52MM	VI	VI	Limited	
	6. Recycle Holdup Tank Rooms 51-55 NN-QQ	VII	VII	No	No operators should be in area.
	7. Filter and Demin. Rooms	VII	VII	No	Rooms are accessible when filter bale or resins are moved and equipment drained.
	8. Seal Water Hx Room 53-54 GG	VII	VII	No	
	9. Boronometer Room 53-54 FF	VII	VII	Yes	Deleted Per 2007 Update.

Figure	Location[1]	Radiation Zone[2] Design Operation	Radiation Zone[2] Refueling/ Shutdown	Accessible At Power	Special Considerations
	10. Corridor Areas	IV	IV	Yes	
12-17	Refer to Figure 12-16 for similar area zoning				
12-18	Refer to Figure 12-19 for similar area zoning.				
12-19	1. Reactor Building Emergency Personnel Lock Area 67-69, 45-47 BB-DD	IV	IV	Yes	
	2. Electrical Penetration Room 45-53, 61-69 AA-DD	III	III	Yes	
12-20	Refer to Figure 12-22 for similar area zoning				
12-21	Refer to Figure 12-22 for similar area zoning.				
12-22	1. Mechanical Penetration Room 61-63 GG-KK	VI	V	Limited	NS supply piping in area.
	2. Mechanical Penetration Room 62-64 JJ-MM	V	V	Limited	NS supply piping in area.
	3. Main Steam Doghouse 61-62 DD-GG	IV	III		
	4. RHR & CS Hx Rooms 62-63 KK-MM	VII	VII	No	Corrosions product buildup adds significantly to radiation level.
	5. Hx Area 60-61 JJ-KK	VII	VII	No	Acessible when drained and flushed.

Figure	Location[1]	Radiation Zone[2] Design Operation	Refueling/ Shutdown	Accessible At Power	Special Considerations
	6. Drum Storage Area 57-58 MM-QQ	VII	VII	No	Storage for Liners and drums. Accessibility controlled by activity.
	7. Evap. Conc. Holdup 59 NN-PP	VII	VII	No	Accessible when tank is drained and flushed.
	8. Radwaste Batching Tank Room 59-60 NN-PP	VII	VII	No	Accessible when tank is drained and flushed.
	9. Concentrates Batch 59 PP-QQ	VII	VII	Limited	Accessible when tank is drained and flushed.
	10. Radwaste Feed Skid Room 59-60 PP-QQ	VII	VII	No	Accessible when flushed.
	11. Fuel Pool Cooling Hx and Pump Room 61-63 NN-QQ	V	V	Limited	
	12. Fuel Pool Cooling Demin. Room 63 NN-PP	VII	VII	No	Accessible when demin. Is empty.
	13. Corridor Areas	IV	IV	Yes	
	14. Filter Bunker Access Hallway	VI	VI	Limited	Access limited due to concentrates transfer line and activity in concentrates batching tank.

Figure	Location[1]	Radiation Zone[2] Design Operation	Radiation Zone[2] Refueling/ Shutdown	Accessible At Power	Special Considerations
	15. Filter Bunker Area	Varies from IV to VII	Varies from IV to VII	Limited	Access to this area is limited due to spent radioactive filter storage as well as periodic transfer of radioactive spent resins (piped through this area) from the Radwaste Batching Tank to the Waste Solidification facility.
12-23	Refer to Figure 12-24 for similar area zoning.				
12-24	1. Electrical Penetration Room 45-53, 61-69 AA-DD	III	III	Yes	
12-25	Refer to Figure 12-26 for similar area zoning.				
12-26	1. Annulus Ventilation Filter Area 50-53 GG-KK	IV	IV	Yes	
	2. Doghouse 52-53 DD-GG	IV	IV	Yes	
	3. RHR Hx and CS Hx Rooms 51-52 KK-MM	VII	VII	No	
	4. Open Corridor Area 52-56 FF-MM	IV	IV	Yes	
	5. Vent. Equipment Room 54-56 FF-HH	III	III	Yes	
	6. Vent Equipment Room 54-60 EE-HH	III	III	Yes	
	7. Fuel Pool Exhaust Filter Area 51-54 KK-QQ	IV	IV	Yes	

Figure	Location[1]	Radiation Zone[2] Design Operation	Radiation Zone[2] Refueling/ Shutdown	Accessible At Power	Special Considerations
	8. Inst. Calibration Room 54-44 PP-QQ	VII	VII		Accessibility determined by source position. For source in storage position, room is Zone III.
	9. H.P Lab and Open Corridor Area 54-57 MM-QQ	III	III	Yes	
	10. Open Corridor Area	IV	IV	Yes	
12-27	Refer to Figure 12-26 for similar area zoning				
12-28	1. Control Room Area 53-60 AA-EE	II	II	Yes	
	2. Vent. Equip. Area 54-60 EE	III	III	Yes	
	3. Elect. Penet. Rooms 53-61 AA-DD	III	III	Yes	

Notes:

1. Location numbering corresponds to that on drawings.
2. Reference **Table 12-15** for definition.

Table 12-19. Design Shield Thickness

	Unit 1 Location		Source			
			Dimension[5]			
Component	el.	Column Lines	R(in)	H(in)	Table/Flag	Shield[6] (ft)
Reactor Coolant System						
Vessel	543	FF-49	86.5	488	Note 1	6.0
Pump	560	GG-47	72	72	12-1,A/B	3.0
Steam Generator	577	FF-46	56.3	406	12-1,A/B	3.0(7)
Pressurizer	577	EE-49	40	240	12-1,C/B	3.0(7)
Pressurizer Relief Tank	594	DD-49	60	222	12-1,C	3.0
Safety Injection System						
Pump	543	HH-54	18	12	Note 2	2.0
Residual Heat Removal System						
Pump	522	GG-54	17.4	12	12-1,K	2.5(10)
Heat Exchanger	577	LL-52	21.75	377	12-1,K	2.5
Containment Spray System						
Pump	522	GG-55	8	12	Note 2	3.0
Heat Exchanger	577	LL-51	28	485	Note 2	2.5
Chemical & Volume Control System						
Regenerative Heat Exchanger	560	DD-51	5.2	174	12-1,A/G	3.0
Excess Letdown Heat Exchanger	560	DD-51	4.3	214	12-1,D	3.0(8)

Component	Unit 1 Location		Source			
			Dimension[5]			
	el.	Column Lines	R(in)	H(in)	Table/Flag	Shield[6] (ft)
Note: Reciprocating Charging Pump No. 1 has been abandoned in place per NSM CN-11392/00. Reciprocating Charging Pump No. 2 has been abandoned in place per NSM CN-21392/00.)	543	JJ-53	8	40	12-1,G	2.5
Centrifugal Charging Pump	543	JJ-55	7	40	12-1,G	2.0
Boric Acid Transfer Pump	560	PP-59	3.5	10	(note 3)	1.5
Letdown Heat Exchanger	577	KK-53	11	197	12-1,D	2.5
Seal Water Heat Exchanger	560	GG-54	10	140	12-1,G	2.0
Volume Control Tank	560	KK-50	45	110	12-1,F	3.0
Boric Acid Tank	560	PP-60	192	81	(note 3)	3.0
Mixed Bed Demineralizer	560	LL-53	15.75	43.75	12-2	4.0 (9)
Cation Bed Demineralizer	560	MM-53	12.75	36	12-2	4.0
Reactor Coolant Filter	560	KK-56	3	16.875	12-3	3.0

Component	Unit 1 Location el.	Column Lines	Dimension[5] R(in)	Dimension[5] H(in)	Source Table/Flag	Shield[6] (ft)
Seal Water Return Filter	560	LL-56	3	16.875	12-3	2.0
Seal Water Injection Filter	560	KK-56	1	19.5	12-3	2.5
Boric Acid Filter	560	NN-57	3	16.875	12-3	1.5
Boronometer	560	FF-54	6.65	18.7	12-1,F	2.0
Boron Recycle System						
Holdup Tank	543	PP-52	180	289	12-1,E	3.0
Evaporator	537	NN-56	21	119	12-1,L	3.0
Evaporator Feed Pump	543	PP-56	2	14	12-1,E	1.5
Evaporator Feed Demineralizer	560	QQ-57	15.5	43.75	12-2	4.0
Evaporator Feed Filter	560	NN-56	3	16.875	12-3	2.5
Evaporator Condensate Demineralizer	560	PP-57	12.75	36	12-2	1.5
Evaporator Condensate Filter	560	PP-57	1	9.875	12-3	1.5
Evaporator Concentrate Filter	560	PP-56	1	9.875	12-3	2.0
Boron Thermal Regeneration System						
Moderating Heat Exchanger	577	JJ-53	9	212	12-1,F	2.5

	Unit 1 Location				Source	
			Dimension[5]			
Component	**el.**	**Column Lines**	**R(in)**	**H(in)**	**Table/Flag**	**Shield[6] (ft)**
Letdown Chiller Heat Exchanger	577	JJ-54	10	206	12-1,F	2.5
Letdown Reheat Heat Exchanger	577	KK-54	281	71.1	12-1,D/F	2.5
Thermal Regeneration Demineralizer	560	LL-54	23.5	68	12-2	4.0 (9)
Liquid Radwaste System						
Evaporator Feed Tank	543	LL-53	54	126	12-1,H	2.5
Waste Drain Tank	543	LL-54	66	85	12-1,D	2.5
Evaporator Feed Pump	543	MM-53	2	14	12-1,H	3.0
Evaporator Feed Filter	560	KK-55	1	9.875	12-3	2.5
Waste Drain Tank Pump	543	MM-54	4	18	12-1,D	3.0
Evaporator	537	LL-52	21	119	12-1,L	3.0
Evaporator Condensate Demineralizer	560	KK-55	15.75	43.75	12-2	1.5
Evaporator Condensate Filter	560	MM-56	1	9.875	12-3	2.0
Reactor Coolant Drain Tank	543	HH-49	18	80	12-1,D	3.0
RCDT Heat Exchanger	543	GG-49	7	175	12-1,D	3.0
RCDT Pump	543	GG-48	5.5	15	12-1,D	3.0

Component	Unit 1 Location el.	Column Lines	Dimension[5] R(in)	H(in)	Source Table/Flag	Shield[6] (ft)
Laundry & Hot Shower Tank	543	LL-63	64	178	12-1,I	1.5
LHST Pump	543	LL-63	4	8	12-1,I	1.5
LHST Primary Filter, Secondary Filter	560	LL-58	1	9.875	12-3	2.0
LHST Carbon Filter	560	KK-63	1	9.875	12-3	2.0
Waste Monitor Tank Filter	560	KK-59	1	9.875	12-3	1.0
Waste Monitor Tank Demineralizer	560	MM-62	15.75	43.75	12-2	3.0
Floor Drain Tank	543	KK-62	57	288	12-1,I	1.5
Floor Drain Tank Pump	543	KK-63	6	10	12-1,I	1.5
Floor Drain Tank Filter	560	LL-58	1	9.875	12-3	2.0
Mixing & Settling Tank	543	KK-59	30	66.5	12-1,I	1.5
Sludge Pump	543	KK-59	4	15	12-1,I	1.5
Mixing & Settling Tank Pump	543	KK-59	4	15	12-1,I	1.5
Solid Radwaste System						
Chemical Drain Tank	537	LL-55	21	120	12-1,H	3.0
Chemical Drain Tank Pump	537	LL-55	60	104	12-1,M	3.0
Spent Resin Storage Tank	543	LL-61	60	77	12-1,M	4.0

Component	Unit 1 Location		Source			
			Dimension[5]			
	el.	Column Lines	R(in)	H(in)	Table/Flag	Shield[6] (ft)
Spent Resin Sluice Filter	560	KK-59	3	16.875	12-3	3.0
Radwaste Batching Tank	577	PP-60	29.75	70.67	12-1,N	4.0[(9)]
Evaporator Concentrate Storage Tank	577	NN-59	42	126	12-1,L	3.0
Gaseous Radwaste System						
Compressor	543	NN-62	6	24.5	12-1,O	4.0
Tank	543	PP-61	60.5	92	12-1,O	4.0
Hydrogen Recombiner	543	NN-61	7	25	12-1,O	1.5
Spent Fuel Pool Cooling System						
SFPC Pump	577	QQ-52	11	15	Note 3	2.0
SFPC Heat Exchanger	577	PP-53	19.5	204	Note 3	2.0
SFPC Demineralizer	577	PP-51	35.75	60	12-2	2.0
SFPC Filter	560	LL-56	6	16.25	12-3	2.0
Skimmer Pump	577	QQ-52	7	4	Note 3	2.0
Skimmer Filter	560	MM-56	3	16.875	12-3	2.0
Nuclear Sampling System						
Heat Exchangers[(4)]	543	EE-53	2.4	14.4	12-1,A	2.0

Component	Unit 1 Location		Source			
			Dimension[5]			
	el.	Column Lines	R(in)	H(in)	Table/Flag	Shield[6] (ft)

Notes:

1. Source is reactor coolant activity and reactor core at full power.
2. Accident source only.
3. Minimal radioactivity expected. Shielding provided for conservatism.
4. Heat exchangers for potentially radioactive samples are located behind a shield wall in the Sample Room.
5. Dimensions are for a right circular cylinder unless otherwise noted.
6. Ordinary concrete or equivalent.
7. Biological shield provided above operating deck level for active height of component.
8. Intermittent use only. No shield on annulus side.
9. Hatch thickness of 3.0 feet have been determined to be adequate shielding.
10. Access to elevation 522 is prohibited Post-LOCA.

Table 12-20. Primary Shield Description

Region	Material	Thickness (in.)
Core Baffle	Stainless Steel	1.125
Coolant	Water	6.52
Core Barrel	Stainless Steel	2.25
Coolant/Neutron pads[1]	Water/Stainless Steel	4.75/2.75
Pressure Vessel	Carbon Steel	8.625
Gap	Air, Insulation	7.00
Biological Shield	Reinforced Concrete	
Detector Wells		72.0
Other		102.0

Note:

1. Neutron pads are affixed to the barrel and cover azimuthal regions which experience peak fast neutron exposures. There are four such panels covering the regions from 30° to 65°, 117° to 150°, 210° to 245°, and 297° to 330°.

Table 12-21. Parameters Used for Design Basis Accident Analysis of Control Room Direct Dose

Power level	3582 MWt
Equivalent fraction of core melting	1.0
Fission product fractional releases	
Noble gases	1.0
Halogens	0.5
Remaining inventory	0.01
Minimum full power operating time	650 days
Clean-up rate following accident	0.0
Containment net free volume	1.02×10^6 ft^3
Post-accident water depth	15.2 ft
Shielding	(see Section 12.3.2.2)
Occupancy time	90 days

Table 12-22. Design Basis Accident Containment Source Strength. (gammas/cc-sec) vs (hours after release)

Gas									
0		**1**		**24**		**720**		**2**	
0.2 MeV	3.9E8	0.2	2.7E8	0.2	2.4E8	0.1	1.4E8	0.1	4.2E6
0.5	6.6E8	0.5	3.9E8	0.5	3.1E8	0.5	1.1E8	0.4	6.1E6
0.9	5.3E8	0.9	3.1E8	0.9	2.0E8	0.9	1.8E7	0.8	2.9E6
1.4	1.7E8	1.4	1.6E8	1.4	1.2E8	1.3	2.9E7	1.6	4.8E5
2.0	1.7E8	2.1	9.4E7	2.1	6.7E7	1.9	1.8E6	2.2	1.7E4
3.0	2.8E7	2.7	1.2E7	2.7	7.4E6	2.5	1.8E5	2.5	1.7E4
Liquid									
0		**1**		**24**		**720**		**2**	
0.2	4.4E9	0.2	3.0E9	0.2	2.7E9	0.1	1.6E9	0.1	4.8E7
0.5	7.5E9	0.5	4.4E9	0.5	3.5E9	0.5	1.3E9	0.4	6.9E7
0.9	5.9E9	0.9	3.5E9	0.9	2.3E9	0.9	2.0E8	0.8	3.3E7
1.4	2.0E9	1.4	1.7E9	1.4	1.4E9	1.3	3.3E8	1.6	5.4E6
2.0	1.9E9	2.1	1.1E9	2.1	7.6E8	1.9	2.0E7	2.2	1.7E5
3.0	3.1E8	2.7	1.4E8	2.7	8.3E7	2.5	2.1E6	2.5	2.0E5

Table 12-23. Comparison of Control Room Area Ventilation System (VC) Filtration System with Regulatory Guide 1.52, Revision 2, March 1978

Paragraph	Compliance Status	Comments
A.	In compliance	This section contains general introductory information. CNS is considered in compliance with this information.
B.	See comments	This section contains a general discussion that CNS is considered in compliance with. It should be noted that the VC filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C.	See comments	This section contains general information that CNS is considered in compliance with. It should be noted that the VC filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C-1-a	In compliance	CNS-1211.00-11
C-1-b	In compliance	a. Original post-accident shielding calculations were performed in accordance with Reg. Guides 1.4 and 1.25, as well as, requirements outlined in NUREG 0737. b. Environmental Qualification Criteria Manual. c. Refer to Reg. Guide section C-3-i for specific values used to meet this criteria.
C-1-c	In compliance	This general philosophy was followed in the design of the filter units.
C-1-d	In compliance	Environmental Qualification Criteria Manual
C-1-e	In compliance	a. Environmental Qualification Criteria Manual b. NUREG 0588 Review

Paragraph	Compliance Status	Comments
C-2-a	In compliance	a. CNS-1211.00-11 (Filter Units) b. CNS-1211.00-05 Supplement 2 (Ductwork) c. CNS-1211.00.06 (Fans)
C-2-b	In compliance	a. Electrical Discipline Design Manual, Design Criteria 1.02 (electrical separation) b. CNS-1108.02-00-0001 (missiles)
C-2-c	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 2 (Ductwork) c. CNS-1211.00-06 (Fans)
C-2-d	In compliance	This atmospheric clean-up system is not subject to any containment pressure surges.
C-2-e	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 2 (Ductwork) c. CNS-1211.00-06 (Fans)
C-2-f	In compliance	The VC filter unit design flow rate is 6,000 cfm.
C-2-g	See comments	Instrument gauges are provided for flow and pressure drops
C-2-h	See comments	In compliance with IEEE Standard 279 and, to the extent applicable, IEEE Standard 334. Compliance with Regulatory Guides 1.30, 1.32, 1.89, 1.100 and 1.118 is discussed in UFSAR Section 8.1.5.
C-2-i	In compliance	System operation is initiated by redundant, safety related load sequencers.
C-2-j	See comments	Filter units will not be removed as intact units. Gasketless filter adsorbers will be used - the design of which permits the fluidizing of the carbon bed for external filling and removal which will permit a minimum of exposure to operating personnel. All other high activity accumulating elements can decay safely in place prior to removal as low level radwaste.
C-2-k	In compliance	The location and design of the VC system intakes protects them from environmental effects.

Paragraph	Compliance Status	Comments
C-2-l	See comments	Startup testing was done in accordance with ANSI/ASME N509-1976 and ASME/ANSI N510-1975. Current and future testing will utilize ANSI/ASME N509-80 and ANSI/ASME N510-80.
C-3-a	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-b	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-c	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-d	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-e	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-f	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-g	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11

Paragraph	Compliance Status	Comments
C-3-h	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-i	See comments	a. CNS complies to the requirements of ANSI/ASME N509-80. b. Specified residence time is based on actual bed thickness and screen area.
C-3-j	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-k	See comments	a. Heat generation is addressed in CNC-1227.00-00-0120 b. System does include low-flow air bleed system and water sprays but these components do not meet the single failure criteria nor do they provide the required low humidity air.
C-3-l	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 2 c. CNS-1211.00-06
C-3-m	In compliance	a. Environmental Qualification Criteria Manual b. CNS-1211.00-06
C-3-n	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria except ANSI/ASME N509-80 is followed. b. CNS-1211.00-05 Supplement 2
C-3-o	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.

Paragraph	Compliance Status	Comments
C-3-p	See comments	a. This requirement applied to the initial design of the dampers. The dampers were designed, in general, to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 2
C-4-a	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-4-b	In compliance	Since all filter banks are arranged for external servicing, three linear feet of separation between filter banks is not needed. Two and one-half feet between filter banks is provided for inspection purposes.
C-4-c	See comments	a. Testing is done per ANSI/ASME N510-80. b. CNS generally uses a grain thief to obtain carbon samples although the filter units are designed to allow for the use of test canisters.
C-4-d	See comments	In general, CNS complies with this requirement. However, since carbon sample testing is done in accordance with ASTM D-3803, moisture is not a significant concern. Thus, operation of the heaters for 10 hours is interpreted as an option not as a requirement.
C-4-e	In compliance	This requirement applied to the initial design of the plant. Filters will only be removed for future "construction" activities if those activities will significantly degrade the filters.
C-5-a	See comments	In compliance except ANSI/ASME N510-80 is used.
C-5-b	See comments	In compliance except ANSI/ASME N510-80 will be used for current and future air uniformity tests. Initial tests were in conformance with ANSI/ASME N510-75.

Paragraph	Compliance Status	Comments
C-5-c	See comments	a. ANSI/ASME N510-80, section 9, "Air-Aerosol Mixing Uniformity Test" will not be performed on the downstream HEPA banks. b. ANSI/ASME N510-80, section 10, "In-Place Leak Test, HEPA Filter Banks" will not be performed on the downstream HEPA banks. c. ANSI/ASME N510-80 will be used for current and future in-place DOP tests. Initial tests were in conformance with ANSI/ASME N510-75. d. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-5-d	See comments	a. The <0.01 ppm residual refrigerant will not be verified in the air system following the challenge of the carbon adsorber bed. Instead, the system will be run with the preheaters energized for at least 10 hours following the test, to drive off any excess refrigerant. b. In compliance except ANSI/ASME N510-80 will be used for current and future in-place carbon penetration tests. Initial tests were in conformace with ANSI/ASME N510-75. c. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-6-a	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 98.05% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 0.95%."

Paragraph	Compliance Status	Comments
C-6-b	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 98.05% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 0.95%." c. Footnote c of Table 2 should read "after 1440 hours of operation" not "after 720 hours of operation." d. A grain thief is an acceptable method for obtaining representative carbon samples. e. Use of grain thief shall be in accordance with MP/0/A/7450/031 and this shall be assumed to meet all requirements of this section. f. Carbon shall meet the requirements of ANSI/ASME N509-80 and shall be tested in accordance with ASTM D-3803-89.
D.	See comments	Clarifications to Regulatory Guide 1.52 are contained within this table, the CNS Technical Specifications and PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP). These clarifications and differences are considered to meet the intent of Regulatory Guide 1.52.

Table 12-24. Comparison Of Auxiliary Building Ventilation System (VA) Filtration System with Regulatory Guide 1.52, Revision 2, March 1978

Paragraph	Compliance Status	Comments
A.	In compliance	This section contains general introductory information. CNS is considered in compliance with this information.
B.	See comments	This section contains a general discussion that CNS is considered in compliance with. It should be noted that the VA filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C.	See comments	This section contains general information that CNS is considered in compliance with. It should be noted that the VA filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C-1-a	In compliance	CNS-1211.00-11
C-1-b	In compliance	a. Original post-accident shielding calculations were performed in accordance with Reg. Guide 1.4 and the requirements outlined in NUREG 0737. b. Environmental Qualification Criteria Manual. c. Refer to Reg. Guide section C-3-i for specific values used to meet this criteria.
C-1-c	In compliance	This general philosophy was followed in the design of the filter units.
C-1-d	In compliance	Environmental Qualification Criteria Manual

Paragraph	Compliance Status	Comments
C-1-e	In compliance	a. Environmental Qualification Criteria Manual b. NUREG 0588 Review
C-2-a	In compliance	a. CNS-1211.00-11 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-b	In compliance	a. Electrical Discipline Design Manual, Design Criteria 1.02 (electrical separation) b. CNS-1108.02-00-0001 (missiles)
C-2-c	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-d	In compliance	This atmospheric clean-up system is not subject to any containment pressure surges.
C-2-e	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-f	In compliance	a. The VA filter unit design flow rate is 30,000 cfm. An allowance of 10% over this flowrate is acceptable. b. The HEPA filter arrangement is five wide and four high.
C-2-g	See comments	Instrument gauges are provided for flow and pressure drops
C-2-h	See comments	In compliance with IEEE Standard 279 and, to the extent applicable, IEEE Standard 334. Applicability and compliance with Reg Guides 1.30, 1.32, 1.89, 1.100 and 1.118 are as discussed in UFSAR Section 8.1.5.
C-2-i	In compliance	System operation is initiated by redundant, safety related load sequencers.

Paragraph	Compliance Status	Comments
C-2-j	See comments	Filter units will not be removed as intact units. Gasketless filter adsorbers will be used - the design of which permits the fluidizing of the carbon bed for external filling and removal which will permit a minimum of exposure to operating personnel. All other high activity accumulating elements can decay safely in place prior to removal as low level radwaste.
C-2-k	In compliance	The VA filter system does not have any outside air intakes.
C-2-l	See comments	Startup testing was done in accordance with ANSI/ASME N509-1976 and ASME/ANSI N510-1975. Current and future testing will utilize ANSI/ASME N509-80 and ANSI/ASME N510-80.
C-3-a	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-b	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-c	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-d	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-e	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11

Paragraph	Compliance Status	Comments
C-3-f	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-g	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-h	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-i	See comments	a. CNS complies to the requirements of ANSI/ASME N509-80. b. Specified residence time is based on actual bed thickness and screen area.
C-3-j	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-k	See comments	a. Heat generation is addressed in CNC-1227.00-00-0120. b. System does include low-flow air bleed system and water sprays but these components do not meet the single failure criteria nor do they provide the required low humidity air.
C-3-l	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 5 c. CNS-1211.00-13
C-3-m	In compliance	a. Environmental Qualification Criteria Manual b. CNS-1211.00-13

Paragraph	Compliance Status	Comments
C-3-n	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria except ANSI/ASME N509-80 is followed. b. CNS-1211.00-05 Supplement 5
C-3-o	See comments	a. This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-3-p	See comments	a. This requirement applied to the initial design of the dampers. The dampers were designed, in general, to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 5
C-4-a	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-4-b	In compliance	Since all filter banks are arranged for external servicing, three linear feet of separation between filter banks is not needed. Two and one-half feet between filter banks is provided for inspection purposes.
C-4-c	See comments	a. Testing is done per ANSI/ASME N510-80. b. CNS generally uses a grain thief to obtain carbon samples although the filter units are designed to allow for the use of test canisters.
C-4-d	See comments	In general, CNS complies with this requirement. However, since carbon sample testing is done in accordance with ASTM D-3803, moisture is not a significant concern. Thus, operation of the heaters for 10 hours is interpreted as an option not as a requirement.
C-4-e	In compliance	This requirement applied to the initial design of the plant. Filters will only be removed for future "construction" activities if those activities will significantly degrade the filters.

Paragraph	Compliance Status	Comments
C-5-a	See comments	In compliance except ANSI/ASME N510-80 is used.
C-5-b	See comments	In compliance except ANSI/ASME N510-80 will be used for current and future air uniformity tests. Initial tests were in conformance with ANSI/ASME N510-75.
C-5-c	See comments	a. ANSI/ASME N510-80, section 9, "Air-Aerosol Mixing Uniformity Test" will not be performed on the downstream HEPA banks. b. ANSI/ASME N510-80, section 10, "In-Place Leak Test, HEPA Filter Banks" will not be performed on the downstream HEPA banks. c. In compliance except ANSI/ASME N510-80 will be used for current and future in-place DOP tests. Initial tests were in conformance with ANSI/ASME N510-75. d. The upstream HEPA filters will meet a DOP penetration criteria of $<1.0\%$ in accordance with FOL Amendment 227/222. e. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).

Paragraph	Compliance Status	Comments
C-5-d	See comments	a. The <0.01 ppm residual refrigerant will not be verified in the air system following the challenge of the carbon adsorber bed. Instead, the system will be run with the preheaters energized for at least 10 hours following the test, to drive off any excess refrigerant. b. In compliance except ANSI/ASME N510-80 will be used for current and future in-place carbon penetration tests. Initial tests were in conformance with ANSI/ASME N510-75. c. The upstream HEPA filters will meet a penetration criteria of <1.0% in accordance with FOL Amendment 227/222. d. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-6-a	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 92% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%."

Paragraph	Compliance Status	Comments
C-6-b	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 92% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%." c. A grain thief is an acceptable method for obtaining representative carbon samples. d. Use of grain thief shall be in accordance with MP/0/A/7450/031 and this shall be assumed to meet all requirements of this section. e. Carbon shall meet the requirements of ANSI/ASME N509-80 and shall be tested in accordance with ASTM D-3803-89.
D.	See comments	Clarifications to Regulatory Guide 1.52 are contained within this table, the CNS Technical Specifications and PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP). These clarifications and differences are considered to meet the intent of Regulatory Guide 1.52.

Table 12-25. Comparison Of Fuel Handling Building Ventilation System (VF) Filtration System with Regulatory Guide 1.52, Revision 2, March 1978

Paragraph	Compliance Status	Comments
A.	In compliance	This section contains general introductory information. CNS is considered in compliance with this information.
B.	See comments	This section contains a general discussion that CNS is considered in compliance with. It should be noted that the VF filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C.	See comments	This section contains general information that CNS is considered in compliance with. It should be noted that the VF filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C-1-a	In compliance	CNS-1211.00-11
C-1-b	In compliance	a. Original post-accident shielding calculations were performed in accordance with Reg. Guides 1.3, 1.4 and 1.25, as well as, requirements outlined in NUREG 0737. b. Environmental Qualification Criteria Manual. c. Refer to Reg. Guide section C-3-i for specific values used to meet this criteria.
C-1-c	In compliance	This general philosophy was followed in the design of the filter units.
C-1-d	In compliance	Environmental Qualification Crtieria Manual

Paragraph	Compliance Status	Comments
C-1-e	In compliance	a. Environmental Qualification Criteria Manual b. NUREG 0588 Review
C-2-a	In compliance	a. CNS-1211.00-11 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-b	In compliance	a. Electrical Discipline Design Manual, Design Criteria 1.02 (electrical separation) b. CNS-1108.02-00-0001 (missiles)
C-2-c	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-d	In compliance	This atmospheric clean-up system is not subject to any containment pressure surges.
C-2-e	In compliance	a. CNS-1211.00-00-0011 (Filter Units) b. CNS-1211.00-05 Supplement 5 (Ductwork) c. CNS-1211.00-13 (Fans)
C-2-f	In compliance	The VF filter unit design flow rate is 16,565 cfm.
C-2-g	See comments	Instrument gauges are provided for flow and pressure drops
C-2-h	See comments	In compliance with IEEE Standard 279 and, to the extent applicable, IEEE Standard 334. Applicability and compliance with Reg Guides 1.30, 1.32, 1.89, 1.100 and 1.118 are as discussed in UFSAR Section 8.1.5.
C-2-i	In compliance	System is in operation whenever irradiated fuel is being moved in the storage pool and during crane operation with loads over the storage pool.

Paragraph	Compliance Status	Comments
C-2-j	See comments	Filter units will not be removed as intact units. Gasketless filter adsorbers will be used - the design of which permits the fluidizing of the carbon bed for external filling and removal which will permit a minimum of exposure to operating personnel. All other high activity accumulating elements can decay safely in place prior to removal as low level radwaste.
C-2-k	In compliance	The VF filter system does not have any outside air intakes.
C-2-l	See comments	Startup testing was done in accordance with ANSI/ASME N509-1976 and ASME/ANSI N510-1975. Current and future testing will utilize ANSI/ASME N509-80 and ANSI/ASME N510-80.
C-3-a	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-b	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-c	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-d	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-e	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11

Paragraph	Compliance Status	Comments
C-3-f	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-g	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-h	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-i	See comments	a. CNS complies to the requirements of ANSI/ASME N509-80. b. Specified residence time is based on actual bed thickness and screen areas.
C-3-j	See comments	a. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. b. CNS-1211.00-11
C-3-k	See comments	a. Heat generation is addressed in CNC-1211.00-00-0108 b. System does include low-flow air bleed system and water sprays but these components do not meet the single failure criteria nor do they provide the required low humidity air.
C-3-l	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 5 c. CNS-1211.00-13

Paragraph	**Compliance Status**	**Comments**
C-3-m	In compliance	a. Environmental Qualification Criteria Manual b. CNS-1211.00-13
C-3-n	See comments	a. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria except ANSI/ASME N509-80 is followed. b. CNS-1211.00-05 Supplement 5
C-3-o	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-3-p	See comments	a. This requirement applied to the initial design of the dampers. The dampers were designed, in general, to be in compliance with this criteria. b. CNS-1211.00-05 Supplement 5
C-4-a	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-4-b	In compliance	Since all filter banks are arranged for external servicing, three linear feet of separation between filter banks is not needed. Two and one-half feet between filter banks is provided for inspection purposes.
C-4-c	See comments	a. Testing is done per ANSI/ASME N510-80. b. CNS generally uses a grain thief to obtain carbon samples although the filter units are designed to allow for the use of test canisters.
C-4-d	See comments	In general, CNS complies with this requirement. However, since carbon sample testing is done in accordance with ASTM D-3803, moisture is not a significant concern. Thus, operation of the heaters for 10 hours is interpreted as an option not as a requirement.

Paragraph	Compliance Status	Comments
C-4-e	In compliance	This requirement applied to the initial design of the plant. Filters will only be removed for future "construction" activities if those activities will significantly degrade the filters.
C-5-a	See comments	In compliance except ANSI/ASME N510-80 is used.
C-5-b	See comments	In compliance except ANSI/ASME N510-80 will be used for current and future air uniformity tests. Initial tests were in conformance with ANSI/ASME N510-75.
C-5-c	See comments	a. ANSI/ASME N510-80, section 9, "Air-Aerosol Mixing Uniformity Test" will not be performed on the downstream HEPA banks. b. ANSI/ASME N510-80, section 10, "In-Place Leak Test, HEPA Filter Banks" will not be performed on the downstream HEPA banks. c. In compliance except ANSI/ASME N510-80 will be used for current and future in-place DOP tests. Initial tests were in conformance with ANSI/ASME N510-75. d. The upstream HEPA filters will meet a penetration criteria of <1.0% in accordance with Generic Letter 83-13. e. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).

Paragraph	Compliance Status	Comments
C-5-d	See comments	a. The <0.01 ppm residual refrigerant will not be verified in the air system following the challenge of the carbon adsorber bed. Instead, the system will be run with the preheaters energized for at least 10 hours following the test, to drive off any excess refrigerant. b. In compliance except ANSI/ASME N510-80 will be used for current and future in-place carbon penetration tests. Initial tests were in conformance with ANSI/ASME N510-75. c. The carbon filters will meet a penetration criteria of <1.0% in accordance with Generic Letter 83-13. d. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-6-a	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 95% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%."

Paragraph	Compliance Status	Comments
C-6-b	See comments	a. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. b. For decontamination efficiencies of 95% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%." c. A grain thief is an acceptable method for obtaining representative carbon samples. d. Use of grain thief shall be in accordance with MP/0/A/7450/031 and this shall be assumed to meet all requirements of this section. e. Carbon shall meet the requirements of ANSI/ASME N509-80 and shall be tested in accordance with ASTM D-3803-89.
D.	See comments	Clarifications to Regulatory Guide 1.52 are contained within this table, the CNS Technical Specifications and PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP). These clarifications and differences are considered to meet the intent of Regulatory Guide 1.52.

Table 12-26. Comparison Of Annulus Ventilation System (VE) Filtration System with Regulatory Guide 1.52 Revision 2, March 1978

Paragraph	Compliance Status	Comments
A.	In compliance	This section contains general introductory information. CNS is considered in compliance with this information.
B.	See comments	This section contains a general discussion that CNS is considered in compliance with. It should be noted that the VE filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C.	See comments	This section contains general information that CNS is considered in compliance with. It should be noted that the VE filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria. Also, pre-startup testing was done per ANSI/ASME N510-75, but current testing is done in accordance with ANSI/ASME N510-80.
C-1-a	In compliance	CNS-1211.00-11
C-1-b	In compliance	1. Original post-accident shielding calculations were performed in accordance with Reg. Guide 1.4 and the requirements outlined in NUREG 0737. 2. Environmental Qualification Criteria Manual. 3. Refer to Reg. Guide section C-3-i for specific values used to meet this criteria.
C-1-c	In compliance	This general philosophy was followed in the design of the filter units.
C-1-d	In compliance	Environmental Qualification Criteria Manual

Paragraph	Compliance Status	Comments
C-1-e	In compliance	1. Environmental Qualification Criteria Manual 2. NUREG 0588 Review
C-2-a	In compliance	1. CNS-1211.00-11 (Filter Units) 2. CNS-1211.00-05 Supplement 6 (Ductwork) 3. CNS-1211.00-06 (Fans)
C-2-b	In compliance	1. Electrical Discipline Design Manual, Design Criteria 1.02 (electrical separation) 2. CNS-1108.02-00-0001 (missiles)
C-2-c	In compliance	1. CNS-1211.00-00-0011 (Filter Units) 2. CNS-1211.00-05 Supplement 6 (Ductwork) 3. CNS-1211.00-06 (Fans)
C-2-d	In compliance	This atmospheric clean-up system is not subject to any containment pressure surges.
C-2-e	In compliance	1. CNS-1211.00-00-0011 (Filter Units) 2. CNS-1211.00-05 Supplement 6 (Ductwork) 3. CNS-1211.00-06 (Fans)
C-2-f	In compliance	The VE filter unit design flow rate is 9,000 cfm.
C-2-g	See comments	Instrument gauges are provided for flow and pressure drops
C-2-h	See comments	In compliance with IEEE Standard 279 and, to the extent applicable, IEEE Standard 334. Applicability and compliance with Reg Guides 1.30, 1.32, 1.89, 1.100 and 1.118 are as discussed in UFSAR Section 8.1.5.
C-2-i	In compliance	1. System operation is initiated by redundant, safety related load sequencers.

Paragraph	Compliance Status	Comments
C-2-j	See comments	Filter units will not be removed as intact units. Gasketless filter adsorbers will be used - the design of which permits the fluidizing of the carbon bed for external filling and removal which will permit a minimum of exposure to operating personnel. All other high activity accumulating elements can decay safely in place prior to removal as low level radwaste.
C-2-k	In compliance	The VE filter system does not have any outside air intakes.
C-2-l	See comments	Startup testing was done in accordance with ANSI/ASME N509-1976 and ASME/ANSI N510-1975. Current and future testing will utilize ANSI/ASME N509-80 and ANSI/ASME N510-80.
C-3-a	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-b	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-c	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-d	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-e	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11

Paragraph	Compliance Status	Comments
C-3-f	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-g	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-h	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-i	See comments	1. CNS complies to the requirements of ANSI/ASME N509-80. 2. Specified residence time is based on actual bed thickness and screen data.
C-3-j	See comments	1. This requirement applied to the initial design of the filter units. The filter units were designed to be in compliance with this criteria. 2. CNS-1211.00-11
C-3-k	See comments	1. Heat generation is addressed in CNC-1227.00-00-0120. 2. System does include low-flow air bleed system and water sprays but these components do not meet the single failure criteria nor do they provide the required low humidity air.
C-3-l	See comments	1. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria. 2. CNS-1211.00-05 Supplement 6 3. CNS-1211.00-06
C-3-m	In compliance	1. Environmental Qualification Criteria Manual 2. CNS-1211.00-06

Paragraph	Compliance Status	Comments
C-3-n	See comments	1. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria except ANSI/ASME N509-80 is followed. 2. CNS-1211.00-05 Supplement 6
C-3-o	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria, however, the discharge connection to the Unit Vent is a water trap.
C-3-p	See comments	1. This requirement applied to the initial design of the dampers. The dampers were designed, in general, to be in compliance with this criteria. 2. CNS-1211.00-05 Supplement 6
C-4-a	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-4-b	In compliance	Since all filter banks are arranged for external servicing, three linear feet of separation between filter banks is not needed. Two and one-half feet between filter banks is provided for inspection purposes.
C-4-c	See comments	1. Testing is done per ANSI/ASME N510-80. 2. CNS generally uses a grain thief to obtain carbon samples although the filter units are designed to allow for the use of test canisters.
C-4-d	See comments	In general, CNS complies with this requirement. However, since carbon sample testing is done in accordance with ASTM D-3803, moisture is not a significant concern. Thus, operation of the heaters for 10 hours is interpreted as an option not as a requirement.

Paragraph	Compliance Status	Comments
C-4-e	In compliance	This requirement applied to the initial design of the plant. Filters will only be removed for future "construction" activities if those activities will significantly degrade the filters.
C-5-a	See comments	In compliance except ANSI/ASME N510-80 is used.
C-5-b	See comments	In compliance except ANSI/ASME N510-80 will be used for current and future air uniformity tests. Initial tests were in conformance with ANSI/ASME N510-75.
C-5-c	See comments	1. ANSI/ASME N510-80, section 9, "Air-Aerosol Mixing Uniformity Test" will not be performed on the downstream HEPA banks. 2. ANSI/ASME N510-80, section 10, "In-Place Leak Test, HEPA Filter Banks" will not be performed on the downstream HEPA banks. 3. In compliance except ANSI/ASME N510-80 will be used for current and future in-place DOP tests. Initial tests were in conformance with ANSI/ASME N510-75. 4. The upstream HEPA filters will meet a penetration criteria of $<1.0\%$ in accordance with FOL Amendment 227/222. 5. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).

Paragraph	Compliance Status	Comments
C-5-d	See comments	1. The <0.01 ppm residual refrigerant will not be verified in the air system following the challenge of the carbon adsorber bed. Instead, the system will be run with the preheaters energized for at least 10 hours following the test, to drive off any excess refrigerant. 2. In compliance except ANSI/ASME N510-80 will be used for current and future in-place carbon penetration tests. Initial tests were in conformace with ANSI/ASME N510-75. 3. The upstream HEPA filters will meet a penetration criteria of <1.0% in accordance with FOL Amendment 227/222. 4. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-6-a	See comments	1. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. 2. For decontamination efficiencies of 92% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%."

Paragraph	**Compliance Status**	**Comments**
C-6-b	See comments	1. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. 2. For decontamination efficiencies of 92% given in Table 2, the Laboratory Test for Representative Sample should be "a methyl iodide penetration of less than 4%." 3. A grain thief is an acceptable method for obtaining representative carbon samples. 4. Use of grain thief shall be in accordance with MP/0/A/7450/031 and this shall be assumed to meet all requirements of this section. 5. Carbon shall meet the requirements of ANSI/ASME N509-80 and shall be tested in accordance with ASTM D-3803-89.
D.	See comments	Clarifications to Regulatory Guide 1.52 are contained within this table, the CNS Technical Specifications and PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP). These clarifications and differences are considered to meet the intent of Regulatory Guide 1.52.

Table 12-27. Filter System Design Parameters

System	Carbon Bed (Minimum Depth, In.)	Heater Size (KW)
Annulus Ventilation	2	45
Control Room Area Pressurizing	4	25
Fuel Handling Area Exhaust	2	80
Auxiliary Building Filtered Exhaust	2	30
Containment Purge Exhaust	2	120

Table 12-28. Comparison of Containment Purge Ventilation System (VP) Filtration System with Regulatory Guide 1.52, Revision 2, March 1978

Paragraph	Compliance Status	Comments
A.	See comments	1. The Containment Purge Filter System is not an engineered safety feature and, thus, Reg Guide 1.52 is not applicable to the system. 2. System design is based on normal plant operation and shutdown modes. System design does, however, ensure a safe release path from the containment in the event of a fuel handling accident inside containment with the purge system operating. 3. Reference to the Containment Purge Filter System (VP) and/or the VP filters in this comparison is meant to include the CPES filters but not the incore instrumentation filters.
B.	See comments	1. See comments for section A. 2. Guidance from ANSI N510 is used to support periodic testing including Technical Specification Requirements.
C.	See comments	This section contains general information that CNS is considered in compliance with. It should be noted that the VP filter units were designed in accordance with ANSI/ASME N509-76. However, CNS also may refer to ANSI/ASME N509-80 for some design criteria.
C-1-a	See comments	See comments for section A.
C-1-b	See comments	1. Reg Guide 1.4 does not apply as the Containment Purge System is Technical Specification limited such that a LOCA is not postulated while the system is in operation. 2. Environmental Qualification Criteria Manual.
C-1-c	See comments	See comments for section C-1-b.

Paragraph	Compliance Status	Comments
C-1-d	See comments	1. The Containment Purge System is Technical Specification limited such that a LOCA is not postulated while the system is in operation. 2. Environmental Qualification Criteria Manual
C-1-e	In compliance	Environmental Qualification Criteria Manual
C-2-a	See comments	System design provides two (2) 50% capacity filter trains and fans. System design does not include demisters or HEPA filters downstream of the adsorbers. Heaters can be used to control relative humidity prior to filtration but are not necessary since carbon sample testing is done in accordance with ASTM D-3803-89.
C-2-b	See comments	1. See comments for section C-2-a. 2. Electrical Discipline Design Manual, Design Criteria 1.02 (electrical separation) 3. CNS-1108.02-00-0001 (missiles)
C-2-c	See comments	1. CNS-1211.00-00-0012 (Filter Units) 2. CNS-1211.00-05 Supplement 6 (Ductwork)
C-2-d	See comments	The Containment Purge System is isolated during the pressure surge resulting from a postulated LOCA. The system is not required to operate during or after the postulated LOCA.
C-2-e	In compliance	1. CNS-1211.00-00-0012 (Filter Units) 2. CNS-1211.00-05 Supplement 6 (Ductwork)
C-2-f	In compliance	The VP filter unit design flow rate is below 30,000 cfm.
C-2-g	See comments	System instrument consists of local flow and pressure drop indication. System discharge flow is totalized and indicated locally. System discharge flow is not recorded at the control room.

Paragraph	Compliance Status	Comments
C-2-h	See comments	a. Not applicable - the system is not designated as Class 1E electrical except for its containment isolation functions.
C-2-i	In Compliance	The Containment Purge System operates continuously during fuel handling activities within the containment. No credit is taken for filtration by the Containment Purge Exhaust System during a postulated fuel handling accident involving non-recently irradiated fuel in the containment. All containment penetrations open to the outside atmosphere must be exhausting through an operable Containment Purge Exhaust System during the movement of recently irradiated fuel assemblies within the containment.
C-2-j	See comments	Filter units will not be removed as intact units. Gasketless filter adsorbers are used - which permits the fluidizing of the carbon bed for external filling and removal. In this manner, CNS complies with the ALARA recommendations.
C-2-k	In compliance	The VP filter system does not have any outside air intakes.
C-2-l	See comments	The VP filters are not ESF atmospheric cleanup systems.
C-3-a	See comments	1. This requirement applied to the initial design of the filter units. 2. The system does not include demisters. 3. CNS-1211.00-12
C-3-b	See comments	1. This requirement applied to the initial design of the filter units. 2. Heaters are Seismic Category II. 3. CNS-1211.00-12
C-3-c	See comments	1. This requirement applied to the initial design of the filter units. 2. Prefilters are tested in accordance with ASHRAE Standard 52 and carry UL Class 2 labels. 3. CNS-1211.00-12

Paragraph	Compliance Status	Comments
C-3-d	See comments	1. This requirement applied to the initial design of the filter units. 2. CNS-1211.00-12
C-3-e	See comments	1. This requirement applied to the initial design of the filter units. 2. CNS-1211.00-12
C-3-f	See comments	1. This requirement applied to the initial design of the filter units. 2. CNS-1211.00-12
C-3-g	See comments	1. This requirement applied to the initial design of the filter units. 2. CNS-1211.00-12
C-3-h	See comments	1. This requirement applied to the initial design of the filter units. 2. CNS-1211.00-12
C-3-i	See comments	1. The VP system is not an ESF system. 2. Specified residence time is based on actual bed thickness and screen area.
C-3-j	See comments	1. This requirement applied to the initial design of the filter units 2. CNS-1211.00-12
C-3-k	See comments	Adsorber section design includes a manual water spray system. Single-failure criterion is not considered in its design.
C-3-l	See comments	1. This requirement applied to the initial design of the system. 2. CNS-1211.00-05 Supplement 6
C-3-m	In compliance	Environmental Qualification Criteria Manual
C-3-n	See comments	1. This requirement applied to the initial design of the system. The system was designed to be in compliance with this criteria except ANSI/ASME N509-80 is followed. 2. CNS-1211.00-05 Supplement 6
C-3-o	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.

Paragraph	Compliance Status	Comments
C-3-p	See comments	1. This requirement applied to the initial design of the dampers. The dampers were designed, in general, to be in compliance with this criteria. 2. CNS-1211.00-05 Supplement 6
C-4-a	See comments	This requirement applied to the initial design of the system. The system was designed, in general, to be in compliance with this criteria.
C-4-b	See comments	Since all filter banks are arranged for external servicing, three linear feet of separation between filter banks is not needed. Two and one-half feet between filter banks are provided for inspection purposes.
C-4-c	See comments	1. Testing is done per ANSI/ASME N510-80. 2. CNS generally uses a grain thief to obtain carbon samples although the filter units are designed to allow for the use of test canisters.
C-4-d	See comments	1. Containment purge system operation is Technical Specification limited. 2. In general, CNS complies with this requirement. However, since carbon sample testing is done in accordance with ASTM D-3803, moisture is not a significant concern. Thus, operation of the heaters for 10 hours is interpreted as an option not as a requirement.
C-4-e	In compliance	This requirement applied to the initial design of the plant. Filters will only be removed for future "construction" activities if those activities will significantly degrade the filters.
C-5-a	See comments	In compliance except ANSI/ASME N510-80 is used.
C-5-b	See comments	In compliance except ANSI/ASME N510-89 will be used for current and future airflow distribution tests. Initial tests were in conformance with ANSI/ASME N510-75.

Paragraph	Compliance Status	Comments
C-5-c	See comments	1. The "Air-Aerosol Mixing Uniformity Test" acceptance criteria shall be that all concentration readings are >50% of the average reading. The HEPA and carbon upstream sample probes will be located at the lowest concentration reading. 2. In compliance except ANSI/ASME N510-80 will be used for current and future in-place DOP tests. Initial tests were in conformance with ANSI/ASME N510-75. 3. A DOP penetration criteria is <1.0% instead of <0.05%. (reference Generic Letter 83-13) 4. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).
C-5-d	See comments	1. The <0.01 ppm residual refrigerant will not be verified in the air stream following the challenge of the carbon adsorber bed. Instead, the system will be run with the preheaters energized for at least 10 hours following the test, to drive off any excess refrigerant. 2. In compliance except ANSI/ASME N510-80 will be used for current and future in-place carbon penetration tests. Initial tests were in conformance with ANSI/ASME N510-75. 3. The carbon adsorber penetration criteria is <1.0% instead of <0.05%. (reference Generic Letter 83-13) 4. Painting, fire and chemical release are as defined in PT/0/A/4450/020, Ventilation Filter Testing Program (VFTP).

Paragraph	Compliance Status	Comments
C-6-a	See comments	1. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. 2. For decontamination efficiencies of 90% given in Table 2, the Laboratory Test for Representative Sample should be a "methyl iodide penetration of less than 6%."
C-6-b	See comments	1. References to ANSI N509-1976 should be interpreted to be ANSI/ASME N509-80. 2. Table 2 does not apply. Instead, a 6% methyl iodide penetration and a 1% inplace penetration are used to correspond with a decontamination factor of 6.7. 3. A grain thief is an acceptable method for obtaining representative carbon samples. 4. Use of grain thief shall be in accordance with MP/0/A/7450/031 and this shall be assumed to meet all requirements of this section. 5. Carbon shall meet the requirements of ANSI/ASME N509-80 and shall be tested in accordance with ASTM D-3803-89.
D.	See comments	The Containment Purge Filter System is not an engineered safety feature and, thus, Reg Guide 1.52 is not applicable to the system.

Table 12-29. Area Radiation Monitoring System

Detector Number	Identification	Location	Sensitivity	Range	Accuracy
1EMF1	Auxiliary Building Corridor	EL 522 FF, 57	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF2	Sample Room	EL 543 EE-FF, 54	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF3	Charging Pump Area	EL 543 GG, 55	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF5	Auxiliary Building Corridor	EL 543 NN, 53	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF7	Auxiliary Building Corridor	EL 560 NN, 55	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF9	Filter Hatch Area	EL 577 LL, 55	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF12	Control Room	EL 594 CC, 57	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF16	Waste Shipping Area	EL 594 RR, 58	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF13	Hot Machine Shop	EL 594 VV, 55	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF14	Hot Chemistry Laboratory	EL 609 UU, 60	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF15	Refueling Bridge - Spent Fuel Building	EL 605 + 10	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF11	Incore Instrument Room	EL 570 + 3 53'6", 90°	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF17	Refueling Bridge - Reactor Building	EL 605 + 10	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF1	Sample Room	EL 543 EE-FF, 60	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%

Detector Number	Identification	Location	Sensitivity	Range	Accuracy
1EMF4	Charging Pump Area	EL 543 GG, 59	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF6	Auxiliary Building Corridor	EL 543 MM, 61-62	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF8	Auxiliary Building Corridor	EL 560 NN, 59	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF10	Filter Hatch Area	EL 577 LL, 58	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF4	Refueling Bridge - Spent Fuel Building	EL 605 + 10	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF3	Incore Instrument Room	EL 570 53'6", 90°	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF2	Refueling Bridge - Reactor Building	EL 605 + 10	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF18	Reactor Coolant Filter 1A	EL 568 KK, 56	1 x 10^{-10} Amps R/hr	10^{-1} - 10^{4} R/hr	±15%
1EMF19	Reactor Coolant Filter 1B	EL 568 KK-LL,56	1 x 10^{-10} Amps R/hr	10^{-1} - 10^{4} R/hr	±15%
2EMF5	Reactor Coolant Filter 2A	EL 568 KK-LL,58	1 x 10^{-10} Amps R/hr	10^{-1} - 10^{4} R/hr	±15%
2EMF6	Reactor Coolant Filter 2B	EL 568 KK-LL, 58	1 x 10^{-10} Amps R/hr	10^{-1} - 10^{4} R/hr	±15%
1EMF20	New Fuel Storage Area 1A	EL 610 VV, 51	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF21	New Fuel Storage Area 1B	EL 610 VV, 49	$120 \frac{counts / min}{mR / hr}$	10^{-1} - 10^{4} mR/hr	±15%

Detector Number	Identification	Location	Sensitivity	Range	Accuracy
2EMF7	New Fuel Storage Area 2A	EL 611+11 VV, 65	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF8	New Fuel Storage Area 2B	EL 611+11 VV, 63	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF22	Reactor Building Purge Filter-Unit 1	EL 594 KK, 53	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF9	Reactor Building Purge Filter-Unit 2	EL 594 KK, 61	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
EMF24	Technical Support Center	EL 601 U, 26	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
EMF23	Waste Solidification Pad	EL 594 WW, 57A	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF26	Main Steam Line Loop A	EL 601 GG, 43	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF27	Main Steam Line Loop B	EL 601 GG, 53	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF28	Main Steam Line Loop C	EL 601 GG, 53	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
1EMF29	Main Steam Line Loop D	EL 601 GG, 44	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF10	Main Steam Line Loop A	EL 601 GG, 70	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF11	Main Steam Line Loop B	EL 601 GG, 61	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF12	Main Steam Line Loop C	EL 601 GG, 61	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
2EMF13	Main Steam Line Loop D	EL 601 GG, 70	$120 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±15%
EMF80	Waste Monitor Tank Building Pipe Chase	MTB EL 594 D-1a	$110 \frac{counts/min}{mR/hr}$	10^{-1} - 10^{4} mR/hr	±10%

Detector Number	Identification	Location	Sensitivity	Range	Accuracy
EMF81	Waste Monitor Tank Building Sump Corridor	MTB EL 594 F-2	$110\ \frac{\text{counts / min}}{\text{mR / hr}}$	10^{-1} - 10^{4} mR/hr	±10%
EMF82	Waste Monitor Tank Building Truck Bay	MTB EL 594 B-4	$110\ \frac{\text{counts / min}}{\text{mR / hr}}$	10^{-1} - 10^{4} mR/hr	±10%

Table 12-30. Estimated - Station Organization and Work Area

			Total per Work Area
Personnel and Staff			
Office[1]:	Manager	1	
	Secretary	1	
	Superintendent	1	
	Clerks	32	
	Nurse	1	36
90/10[(2)]:	Security	214	214
50/50[3]:	Engineering & Supervisors	9	
	Safety Assts.	3	12
OPERATIONS			
Office:	Superintendent	1	
	Clerks	4	5
50*/50[4]:	Operating Eng	4	
	Asst Oper Eng	3	7
Control Area:	Shift Super	7	
	Asst Shift Sup	13	
	Control Oper	15	
	Asst Cntl Oper	10	45
Field:	Operators	43	
	Enginering	12	55

			Total per Work Area
Technical Services			
Office[1]:	Superintendent	1	
	Licensing & Projects	1	
	Performance Engr.	1	
	Chemist	1	
	Radiation Protection	1	
	Clerks	9	14
50/50:	Engr (Licensing & Proj)	13	
	Engr (Performance)	12	25
	Asst Chemist	16	
	Asst R.P.	17	33
Field:	Tech (Performance)	10	10
	Tech (Chemist)	46	
	Tech (R.P.)	46	92
MISC			
50/50:	SSD	100	
	Station Maint Sup	150	250
	Janitorial	50	
	Quality Assurance	39	
	Outside Vendors	10	99
Office:	Transmission	8	

			Total per Work Area
Maintenance			
Office:	Superintendent	1	
	Engr (I&E)	1	
	Maint. Engr.	1	
	Planning Engr.	1	
	Materials Super.	1	
	Materials Personnel	23	
	Clerks	11	40
50/50:	Engr & Supv (I&E)	18	18
	Engr & Supv (Maint)	19	
	Engr (Planning)	15	34
Field:	Tech. (I&E)	60	60
	Tech. (Maint.)	55	
	P.M. Personnel	5	60[(1)]

	Total per Work Area	Total per Work Area	Total per Work Area

Notes:

1. 100% Of Time In Office
2. 90% In Office, 10% In Field
3. 50/50, 50% Office, 50% Field
4. 50*/50, 50% in Control Area, 50% Time In Field

Table 12-31. Dose Assessment - Number of Personnel and Times of Occupancy in Radiation Areas

Radiation Work Areas		Personnel and Staff	Man/Hrs per Week		Maintenance	Misc.
			Operations	Tech. Services		
				92/7.2	60(1)/12	
1.	Aux. Bldg. Corridors	214/4	7/2	33/3.6	60/6	99/8
		3/10	55/4	10/4	18/2	250/4
		9/8		25/2	34/6	
				92/7.2	34/1.6	250/.4
2.	Sample Room and Hot Lab	9/4	7/1	33/3.6	60/1	
			55/2	10/2		
				25/1		
3.	Letdown Recycle	-	7/2	92/7.2	60/2	250/1
			55/4	33/3.6	18/2	
				10/4	60(1)/6	
				25/2	34/1.6	
4.	Waste Gas	-	7/2	92/7.2	18/2	250/1
			55/4	33/3.6	60/2	
				10/4	34/1.6	
				25/2	60(1)/6	
5.	Liquid Waste	-	7/2	92/7.2	18/2	250/1
			55/4	33/3.6	60/2	
				10/4	34/1.6	
				25/2	60(1)/6	

Radiation Work Areas	Personnel and Staff	Man/Hrs per Week		Maintenance	Misc.
		Operations	Tech. Services		
6. Solid Waste	-	7/1	92/4	34/1.6	250/.6
		55/2	33/2	60/1	
			10/2		
			25/1	60[1]/4	
7. Turbine Bldg	3/10	7/10	10/20	18/2	99/8
	9/4	55/20	25/10	60/6	250/8
				34/6	
				60[1]/6	
8. Control Room	9/4	7/20	-	18/10	99/4
		45/40		60/20	250/4
9. Service & Admin Bldg, Outside	36/40	5/40	14/40	40/40	8/40
	214/36		58/20	52/20	250/20
	3/20				99/20
	9/20				

Note:

1. 100% of time in office.

Table 12-32. Routine Operation Dose Assessment

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Radiation Work Area	***Personnel and Staff***	***Operations***	***Tech. Services***	***Maint.***	***Misc. SMS SSD***	***Total Man-Rem Week***	***Total Man-Rem Year***
	Weekly Occupancy (Man Hrs/Week) * Dose Rate (R/Hr) = Man-Rem/Week						
1. Aux. Bldg. Corridors	*958.*5.3E-4 = .51*	*234.*5.3E-4 = .13*	*871*5.3E-4 = .46*	*1320*5.3E-4 = .70*	*1792*5.3E-4 = .95*	*2.75*	*143.*
2. Sample Rm. & Hot Lab	*36*2.E-4 = .01*	*117*2.E-4 = .02*	*826*2.E-4 = .17*	*114.4*2.E-4 = .02*	*100*2.E-4 = .02*	*.24*	*12.5*
3. Letdown & Recycle	*-*	*234*4.E-4 = .09*	*871*4.E-4 = .35*	*570.4*4.E-4 = .23*	*250*2.E-3 = .50*	*1.17*	*60.8*
4. Waste Gas	*-*	*234*2.E-4 = .05*	*871*2.E-4 = .17*	*570.4*2.5E-3 = 1.43*	*250*2.5E-3 = .63*	*2.28*	*118.6*
5. Liquid Waste	*-*	*234*1.E-3 = .23*	*871*1.E-3 = .87*	*570.4*2.E-3 = 1.14*	*250*2.E-3 = .50*	*2.74*	*142.5*
6. Solid Waste	*-*	*117*1.E-3 = .12*	*479*4.E-4 = .19*	*354.4*1.E-3 = .35*	*150*1.E-3 = .15*	*.81*	*42.1*
7. Turbine Bldg	*66*5.E-5 = .003*	*1170*5.E-5 = .06*	*450*5.E-5 = .02*	*960*5.E-5 = .05*	*2792*5.E-5 = .14*	*.27*	*14.0*
8. Contron Area	*36*5.E-5 = .002*	*1940*5.E-5 = .10*	*-*	*1380*5.E-5 = .07*	*1396*5.E-5 = .07*	*.24*	*12.5*
9. Service & Admin Bldg., Outside	*9384*5.E-6 = .05*	*200*5.E-6 = .001*	*1720*5.E-6 = .01*	*2640*5.E-6 = .01*	*7300*5.E-6 = .04*	*.11*	*5.7*
Work Group Exposure	*(Man-Rem) wk* *.58*	*.80*	*2.24*	*4.0*	*3.0*	*TOTAL STATION DOSE NORMAL OPERATIONS*	

Radiation Work Area		***Personnel and Staff***	***Operations***	***Tech. Services***	***Maint.***	***Misc. SMS SSD***	***Total Man-Rem Week***	***Total Man-Rem Year***
	Weekly Occupancy (Man Hrs/Week) * Dose Rate (R/Hr) = Man-Rem/Week							
52 wks/year	*(Man-Rem) yr*	*30.2*	*41.6*	*116.5*	*208.*	*156.*	*552 MAN-REM YEAR*	
Exposure Per Individual Per Year		*.12*	*.37*	*.67*	*.98*	*.44*	*~5 REM PERSON-YEAR*	

Table 12-33. Total Occupational Radiation Exposure Estimates (for one unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Activity	***Average Annual Exposure (man-rem/yr)***
Reactor operations and surveillance	*31.5*
Routine maintenance	*83.4*
Waste processing	*11.6*
Refueling	*43.6*
Inservice inspection	*16.3*
Special maintenance	*17.5*
TOTAL	*203.9*

Table 12-34. Occupational Radiation Exposure Estimate for Reactor Operations and Surveillance (for one unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose (man-rem)***
Containment Building				
Routine patrols	*0.025*	*39.8*	*-*	*0.99*
Operations supervision	*Note 1*	*-*	*-*	*9.9*
Inspect reactor coolant drain tank	*0.100*	*0.25*	*Annual*	*0.025*
Inspect accumulators, pressurizer, relief tanks, etc.	*1.100/0.005 0.0025*(2)	*1/3/1*(2)	*Annual*	*0.115*
Inspect post-accident hydrogen electric recombiner	*0.0025*	*4*	*Annual*	*0.010*
Reactor Auxiliary Building				
Routine patrols	*0.0025*	*1650*	*-*	*4.12*
Boron thermal regeneration system chiller and chiller pump units inspection	*0.0025*	*0.033*	*Shift*	*0.09*
Inspect letdown reheat, letdown chiller, letdown, moderating, and seal water heat exchangers, and associated pumps & valves	*0.100*	*0.066*	*Shift*	*7.2*
Inspect volume control tank valve room	*0.100*	*0.017*	*Shift*	*1.9*
Inspect centrifugal charging pumps and associated valves	*0.100*	*0.033*	*Shift*	*3.6*
Inspect demineralizer valve area	*0.025*	*0.17*	*Shift*	*0.9*
Inspect boric acid tank, pumps and valves, recycle evaporator, and transfer pumps	*0.025*	*0.083*	*Shift*	*2.3*
Inspect surge tank	*0.0025*	*4*	*Monthly*	*0.12*
Inspect boric acid batching tank	*0.005*	*0.17*	*Shift*	*0.2*
Inspect chemical mixing tank	*0.0025*	*0.017*	*Shift*	*0.046*
Inspect reactor makeup water pump	*0.0025*	*0.017*	*Shift*	*0.046*

Item	*Average Expected Dose Rate (rem/hr)*	*Time (man-hr)*	*Frequency*	*Annual Dose (man-rem)*

Notes:

1. *All radiation areas.*
2. *X/Y dose rate and A/B time indicates "A" man-hours in "X" radiation field and "B" man-hours in "Y" radiation field.*

Table 12-35. Occupational Radiation Exposure Estimate For Routine Maintenance (For One Unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose (man-rem)***
Containment Building				
Service reactor coolant drain tank pumps	*0.100*	*9*	*Annual*	*0.9*
Service reactor coolant drain tank heat exchangers	*0.100*	*9*	*Annual*	*0.9*
Service reactor coolant drain tank cooler	*0.100*	*5*	*Annual*	*0.5*
Service incore instrumentation drive systems	*0.025*	*20*	*Annual*	*0.5*
Inspect and service excess letdown and regenerative heat exchangers	*0.100*	*13*	*Annual*	*1.3*
Routine maintenance service				
1. Pumps (except reactor coolant pumps)	*0.025*	*168*	*Annual*	*4.2*
2. Valves	*0.100*	*172*	*Annual*	*17.2*
3. Miscellaneous items	*0.0025*	*360*	*Annual*	*0.9*
Service reactor coolant pumps including oil change (4 pumps per year) and cartridge seal replacement (1 pump per year)	*0.100*	*48*	*Annual*	*4.8*
Service excore detectors	*0.100*	*5*	*Annual*	*0.5*
Reactor Auxiliary Building				
Service boron thermal regeneration system chiller pump	*0.0025*	*9*	*Annual*	*0.02*
Service centrifugal charging pumps	*0.025*	*150*	*Annual*	*3.8*
Service boric acid and recycle evaporator feed pumps	*0.025*	*9*	*Annual*	*0.2*
Chemical and volume control system filter cartridge replacement	*0.10*	*41*	*Annual*	*4.1*
Valve maintenance (general) of nuclear steam supply system components	*0.100*	*6*	*Weekly*	*29*
Service boron recycle evaporator package	*0.100/0.025*[1]	*5/45*[1]	*Annual*	*1.63*
Integrated leak rate test of nuclear steam supply system fluid systems	*0.005*	*400*	*Annual*	*2.0*
Inspect and service RHR heat exchangers & pumps	*0.100*	*13*	*Annual*	*1.3*
Inspect and service hydrostatic test pump	*0.0025*	*12*	*Annual*	*0.03*

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose (man-rem)***
Inspect and service boron thermal regeneration system chillers and chiller surge tank	*0.0025*	*10*	*Weekly*	*1.30*
Inspect and service boron injection recirculation pump	*0.0025*	*8*	*Monthly*	*0.24*
Service boric acid filter and tanks	*0.100*	*4*	*Monthly*	*4.80*
Inspect and service boron monitoring system	*0.0025*	*0.5*	*Shift*	*1.37*
Inspect and service CCW heat exchangers, pumps & surge tank	*0.0025*	*2.0*	*Weekly*	*0.26*
Service reactor makeup water pump	*0.0025*	*32*	*Annual*	*0.08*
Service thermal regeneration demineralizers	*0.100*	*16*	*Annual*	*1.6*

Note:

1. *X/Y dose rate and A/B time indicates "A" man-hours in "X" radiation field and "B" man-hours in "Y" radiation field.*

Table 12-36. Occupational Radiation Exposure Estimate For Waste Processing (For One Unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose (man-rem)***
Inspect and service catalytic recombiner gas analyzer	*0.005*	*16*	*Annual*	*0.08*
Inspect waste evaporator system	*0.100*	*0.17*	*Weekly*	*0.88*
Inspect waste gas system	*0.100*	*0.17*	*Weekly*	*0.88*
Inspect chemical drain tank and pump	*0.100*	*0.17*	*Weekly*	*0.88*
Inspect high activity spent resin storage tank	*0.100*	*0.17*	*Monthly*	*0.20*
Service liquid waste processing system	*0.100*	*27*	*Annual*	*2.70*
Service spent resin sluice pump	*0.050*	*17*	*Annual*	*0.85*
Service floor drain tank pump	*0.0025*	*9*	*Annual*	*0.02*
Service waste evaporators	*0.100*	*51*	*Annual*	*5.10*

Table 12-37. Occupational Radiation Exposure Estimate For Refueling (For One Unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	*Average Expected Dose Rate (rem/hr)*	*Time (man-hr)*	*Annual Dose (man-rem)*
Clean cavity prior to refueling	*0.025*	*40*	*1.0*
Remove earthquake bars	*0.025*	*8*	*0.2*
Remove reactor vessel insulation	*0.100*	*8*	*0.8*
Remove blind flange	*0.100*	*1*	*0.1*
Disconnect control rod drive mechanism cables	*0.025*	*7*	*0.18*
Disconnect thermocouples (2)	*0.500*	*1*	*0.5*
Retract incore thimbles	*0.025*	*24*	*0.60*
Detension and remove reactor vessel studs	*0.050*	*51*	*2.6*
Install stud hole plugs	*0.050*	*10*	*0.50*
Install cavity seal ring	*0.050*	*14*	*0.7*
Attach main	*0.025*	*4*	*0.1*
Remove head and upper internals and store	*0.050*	*12*	*0.6*
Perform fuel shuffle	-	-	*6.0*
1. Fuel handling in containment			
a. Check out refueling equipment	*0.100/0.005*(1)	*8/24*(1)	*0.9*(1)
b. Perform fuel shuffle (64 assemblies)	*0.005*	*600*	*3.0*
c. Perform quality assurance on core reload	*0.005*	*15*	*0.08*
2. Fuel handling in fuel handling building			
a. Check out refueling equipment	*0.005/0.0025*(1)	*16/16*(1)	*0.12*
b. Perform fuel shuffle	*.0025*	*360*	*0.9*
c. Inspect and change out spent fuel pool demineralizers	*0.100*	*4*	*0.4*

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Annual Dose (man-rem)***
Clean, inspect, and test studs and tentioners	*0.025*	*20*	*0.5*
Change head O-rings	*0.500*	*4*	*2.0*
Install head and upper internals	*0.050*	*12*	*0.6*
Clean reactor cavity	*0.050*	*50*	*2.5*
Clean reactor vessel flange	*0.500*	*10*	*5.0*
Install incore thimbles	*0.005*	*20*	*0.1*
Remove stud hole plugs	*0.050*	*16*	*0.8*
Clean stud holes	*0.050*	*16*	*0.8*
Install and tension reactor vessel studs	*0.050*	*153*	*8.0*
Install blind flange	*0.500*	*3*	*1.5*
Reconnect control rod drive mechanism	*0.025*	*4*	*0.1*
Connect thermocouples(2)	*0.500*	*2*	*1.0*
Remove cavity seal ring	*0.050*	*6*	*0.3*
Install reactor vessel insulation	*0.100*	*8*	*0.8*
Install earthquake bars	*0.025*	*12*	*0.3*

Note:

1. *X/Y dose rate and A/B time indicates "A" man-hours in "X" radiation field and "B" man-hours in "Y" radiation field.*

Table 12-38. Occupational Radiation Exposure Estimate For Inservice Inspection (For One Unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose Over 10-Year Period (man-rem)***
Inservice inspection or reactor vessel and reactor coolant piping	*0.100*	*580*	*1 per 10 years[(1)]*	*5.8*
Insulation removal from reactor vessel nozzle and reactor coolant piping	*0.100*	*200*	*1 per 10 years[(1)]*	*2.0*
Snubber inspection of reactor coolant piping	*0.005*	*2200*	*1 per 10 years[(1)]*	*1.1*
Steam generator inservice inspection (4 steam generators)	*0.125*	*470*	*1 per 10 years[(1)]*	*5.9*
Steam generator eddy current inspection	*0.015*	*600*	*Note 2*	*1.5*

Notes:

1. *Inservice inspection is performed over a 10-year period on a schedule defined in the Technical Specifications.*
2. *Per Regulatory Guide 1.83, eddy current inspection for steam generator tubes would occur at year 1, year 2, year 5, and year 8. Two steam generators are inspected at year 1 and one steam generator is inspected in subsequent years.*

Table 12-39. Occupational Radiation Exposure Estimate For Special Maintenance[1] (For One Unit)

HISTORICAL INFORMATION IN ITALICS BELOW NOT REQUIRED TO BE REVISED

Item	***Average Expected Dose Rate (rem/hr)***	***Time (man-hr)***	***Frequency***	***Annual Dose Over 10-Year Period (man-rem)***
Steam generator tube plugging	*0.24*	*52*	*1 per 2 years*	*6.1*
Steam generator tube plug welding	*0.21*	*52*	*1 per 10 years*	*1.1*
Sludge lancing	*0.06*	*160*	*1 per year*	*9.8*
Control rod drive mechanism repair	*0.50*	*5*	*1 per 5 years*	*0.5*

Note:

1. *These data reflect dose estimates for projected special maintenance and repair tasks and do not include dose estimates for uniques tasks that may be performed on limited basis such as unforeseen major repair tasks or unusual inspection efforts.*

Table 12-40. RCA Description and RCA Control Points

	Auxiliary Building	RCA Control Points	
Elevation	**RCA Description**	**Location**	**Type**
522'	All of the elev. is inside RCA	N/A	N/A
543'	All of the elev. is inside RCA	N/A	N/A
550'	Unit 2 UHI Building. All of the elev. is inside RCA	Unit 2 Yard	Limited Access [3]
560'	All of the elev. is inside RCA with the following exceptions: Rooms 362, 363, 372, 373 and the diesel generator rooms.	BB 45, 69	Limited Access[2]
		CC 53, 61	Limited Access[2]
577'	All of the elev. is inside RCA	U 36 (Service Bldg)	Main Entrance Exit Point
594'	All of elev. is inside RCA with the following exceptions: Rooms 564, 573, 574, 575 and sections of 563 and 576.	HH 42, 72	Limited Access[2]
		DD 60	Limited Access[2]
		VV 58	Limited Access[2]
		UU 47, 67	Limited Access[2]
		VV 48, 55, 59, 60, 62	Limited Access[2]
		AA 48, 66	Limited Access[2]
		WW61	Normal Use[1]
609'	All of elev. is inside RCA with the following exceptions: Chemistry/RP Office at North end.	RR 52	Limited Access[2]

Notes:

1. Normal use-Entrance/exit point
2. Limited Access-access controlled by Radiation Protection.
3. Temporary SPA for the MOX Fuel Project. Limited Access-access controlled by Radiation Protection.

Table 12-41. Design Source Strengths for the Retired Steam Generator Storage Facility

Radionuclide	Curies
Zr-95	8.44E-2
Nb-95m	3.45E-1
Tc-99	3.45E-1
Ru-103	6.33E-3
Ru-106	4.85E-1
Sb-124	3.52E-3
Sb-125	1.06E+0
Ce-144	1.16E+0
C14	1.20E-1
Cv-51	1.71E+0
Mn-54	3.46E+0
Fe-55	2.95E+0
Co-58	2.53E+1
Fe-59	1.05E-1
Co-60	3.25E+1
Co-57	1.13E-2
Total	6.97E+1 (Note: Each Steam Generator)