AREVA

US EPR EQ Program Update

by

Nissen M. Burstein

Advisory Engineer,

Electrical Systems, New Plants Deployment

AREVA NP Inc.

Presented at SC-2 Meeting 07-02
November 6, 2007, Clearwater, FL

US EPR
General Layout

Table 3D-1 – Typical Mild Environment Parameter Limits

Description	Limit	Comments
Temperature	<115F <122F	Outside containment Inside containment
Pressure	atmospheric	Nominal
Humidity	20% to 80% Non-condensing	Outside containment MS/MF, Diesel, Turbine, inside containment
Radiation	<1E3 R, gamma <1E4 R, gamma	electronic devices non-electronic
Chemical Spray	N/A	
Submergence	-5’ -4” Elev.	Inside containment

Table 3D-2 – Equipment Post-accident Operability Times

Description	Req'd Duration
Immediate Operability	2 Hours
Short-term	24 Hours
Medium-term	4 Months
Long-term	1 Year

Table 3D-3 – EQ Program Margin Requirements

Parameter	Req'd Margin	Notes
Peak Temperature	+15F	Accident profile
Peak Pressure	+10% of gauge	Accident profile
Radiation	+10%	Accident TID
Power Supply Voltage	+/-10%	Not to exceed design limits
Line Frequency	+/-5%	Not to exceed design limits
Equipment operating time	+10%	Time equip req'd to operate from start of DBE
Seismic Vibration	+10%	Added to accel req'ts at mounting point

Table 3D-4 – Typical Normal Operating Environments

Location/Parameter		Normal Range
Containment Bldg		
Temperature		59 – 122F
Pressure		Sub-atmospheric
Humidity		30 – 70%/Non-condensing
Radiation	5.0E-3 to 5.3E1 r/h	2.4E3 to 2.8E7 TID
Annulus Bldg		
Temperature		45 – 113F
Pressure		Sub-atmospheric
Humidity		Non-condensing
Radiation	5.0E-3 to 3.0E1 r/h	2.4E3 to 1.5E7 TID
Elec Area, SGB		
Temperature		41 – 104F
Pressure		Atmospheric
Humidity		20 -80%
Radiation	2.5E-4 r/h	1.3E2 TID

Table 3D-4 – Typical Normal Operating Environments (cont.)

Location/Parameter		Normal Range
Mech Area, SGB		
Temperature		50 – 113F
Pressure		Sub-atmospheric
Humidity		25 – 70%/Non-condensing
Radiation	2.5E-4 to 8.0E-1 r/h	1.3E2 to 4.2E5 TID
Fuel Bldg		
Temperature		50 – 113F
Pressure		Sub-atmospheric
Humidity		25 – 70%
Radiation	1.2E1 r/h	6.3E6 TID
Auxiliary Bldg, except mixed bed filters		
Temperature		50 – 113F
Pressure		Sub-atmospheric
Humidity		25 - 70%
Radiation	1.2E1 r/h	6.3E6 TID
mixed bed filters	2.0E4 r/h	1.05E10 TID

Table 3D-6 – Operating Temperature Ranges for Selected Components

Type of Equipment/System	Temperature Range
Raw Water System	>32 (no 1E equipment in system)
Borated Water System	45 to 113F
I&C Equipment	41 to 104F
Electrical components (transformers, switchgear, etc.)	41 to 104
Computers and peripherals	50 to 95F
Batteries	66 to 88F

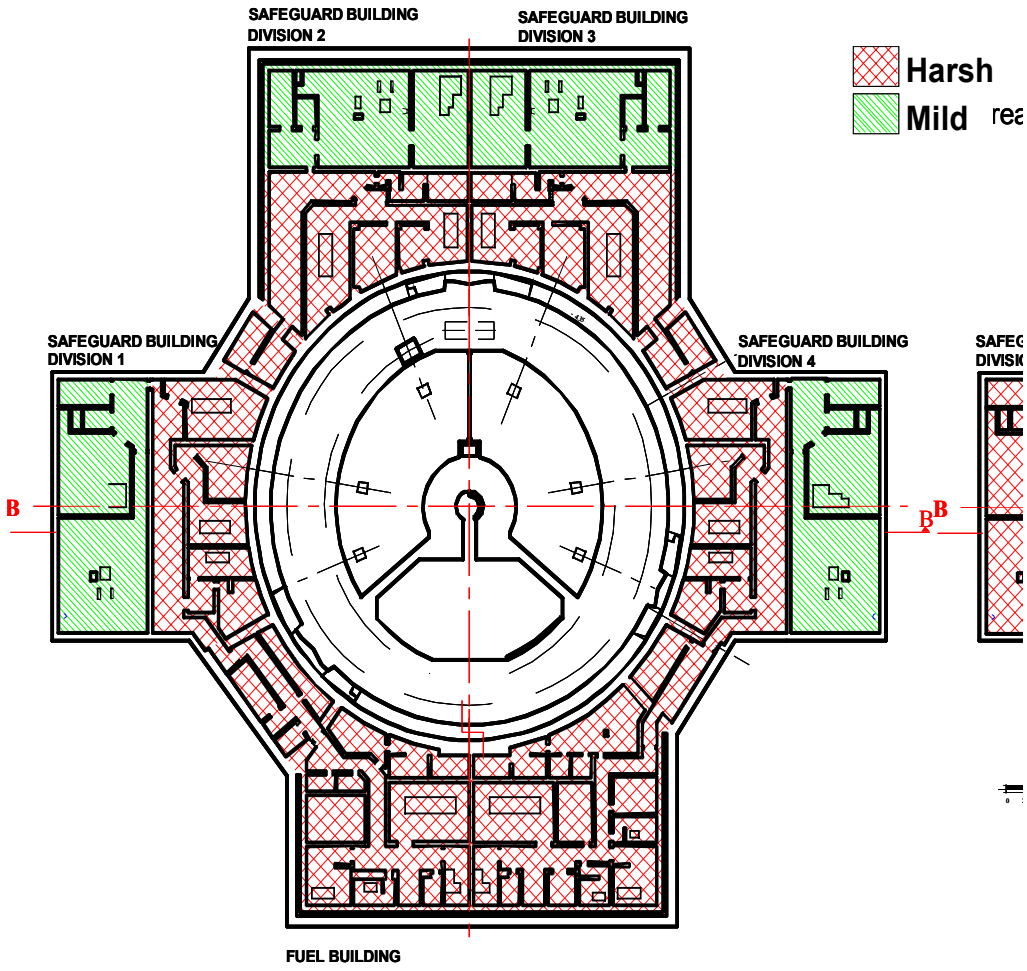
Table 3D-7 Abnormal Room Conditions

Rooms	Max Temperature	Humidity
Reactor Bldg		
Non-accessible areas	131F	Non-condensing
Localized hot-spots	140F	Non-condensing
Electrical areas of SGB		
All Locations	104F	20 – 80%

Table 3D-9 Accident Radiation, TID

Location	1 Year TID, Rads
Containment Bldg	1.6E8, gamma; 5.0E8, beta
Annulus Bldg	4.8E5, gamma; 2.3E6, beta
Elec Area, SGB	5E-1 to 1E3, gamma
Mech Area, SGB	9E6, gamma
Fuel Bldg	1.1E6, gamma
Auxiliary Bldg, except mixed bed filters	1.05E5, gamma
Auxiliary Bldg, mixed bed filters	1.75E8, gamma

Harsh and Mild Radiation Zones in Safeguards Buildings

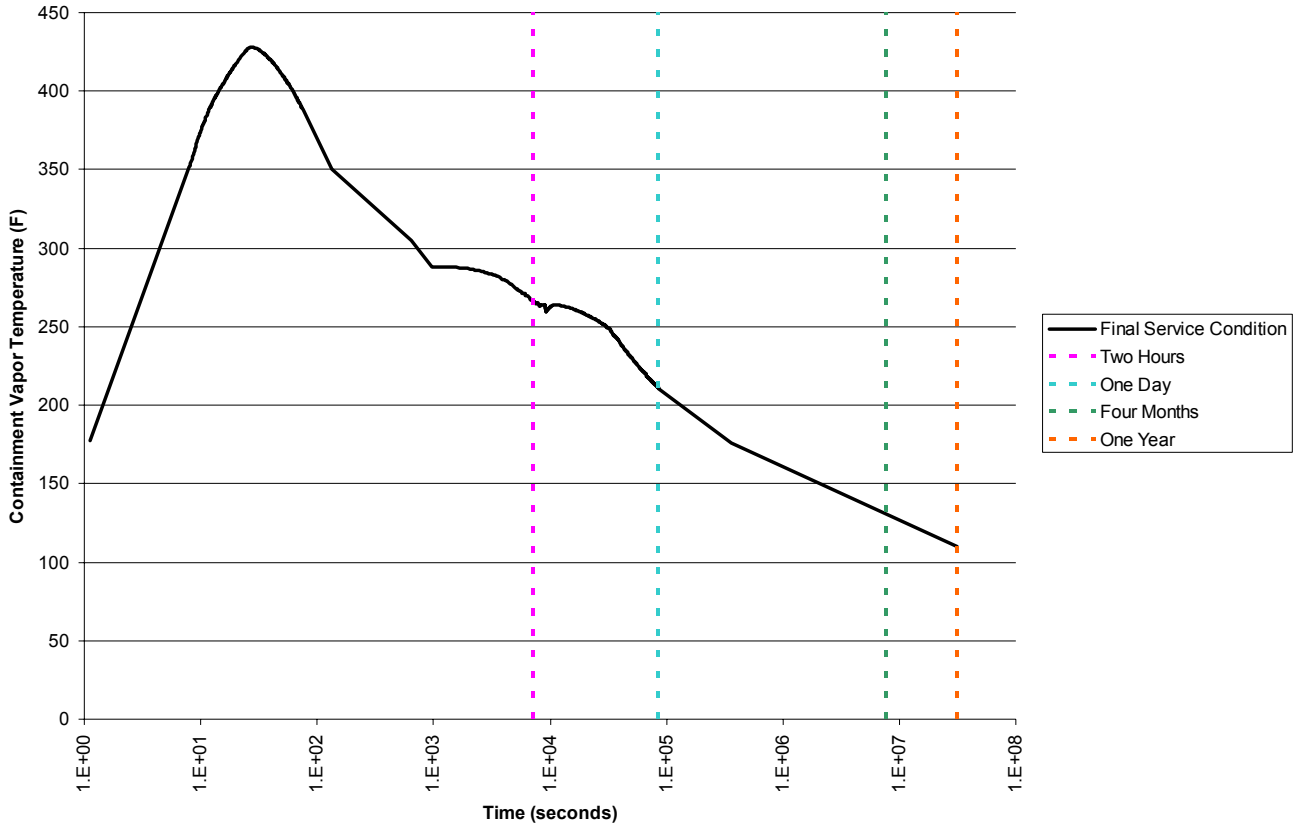


Harsh and Mild Radiation Zones in Safeguards Buildings

Harsh

Mild

Combined LOCA/MSLB Temperature Service Condition Envelope Inside Containment



Combined LOCA/MSLB Pressure Service Condition Envelope Inside Containment