ArevaEPRDCPEm Resource

From: BRYAN Martin (EXTERNAL AREVA) [Martin.Bryan.ext@areva.com]
Sent: Friday, February 11, 2011 5:34 PM
To: Tesfaye, Getachew
Cc: DELANO Karen (AREVA); ROMINE Judy (AREVA); GUCWA Len (EXTERNAL AREVA); WILLIFORD Dennis (AREVA); HALLINGER Pat (EXTERNAL AREVA); PATTON Jeff (AREVA); RANSOM James (AREVA); Carneal, Jason
Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 437, FSARCh. 6, Question 6.2.1-99
Attachments: Draft RAI 437 Q6.2.1-99 Response US EPR DC.pdf

Getachew,

To support the final response, attached is a draft response for question 6.2.1-99. Let me know if the staff has questions or if this can be sent as a final response.

Thanks,

Martin (Marty) C. Bryan
U.S. EPR Design Certification Licensing Manager
AREVA NP Inc.
Tel: (434) 832-3016
702 561-3528 cell
Martin.Bryan.ext@areva.com

From: BRYAN Martin (External RS/NB)
Sent: Friday, November 19, 2010 2:49 PM
To: 'Tesfaye, Getachew'
Cc: DELANO Karen (RS/NB); ROMINE Judy (RS/NB); BENNETT Kathy (RS/NB); GUCWA Len (External RS/NB); 'Miernicki, Michael'
Subject: Response to U.S. EPR Design Certification Application RAI No. 437, FSARCh. 6

Getachew,

Attached please find AREVA NP Inc.'s response to the subject request for additional information (RAI). The attached file, "RAI 437 Response US EPR DC.pdf" provides a schedule since a technically correct and complete response to the 6 questions is not provided.

The following table indicates the respective pages in the response document, "RAI 437 Response US EPR DC.pdf," that contain AREVA NP's response to the subject questions.

Question #	Start Page	End Page
RAI 437 — 06.02.01-96	2	2
RAI 437 — 06.02.01-97	3	3
RAI 437 — 06.02.01-98	4	4
RAI 437 — 06.02.01-99	5	5
RAI 437 — 06.02.01-100	6	6
RAI 437 — 06.02.01-101	7	7

A complete answer is not provided for 6 of the 6 questions. The schedule for a technically correct and complete response to these questions is provided below.

Question #	Response Date
RAI 437 — 06.02.01-96	March 31, 2011
RAI 437 — 06.02.01-97	March 31, 2011
RAI 437 — 06.02.01-98	March 16, 2011
RAI 437 — 06.02.01-99	March 16, 2011
RAI 437 — 06.02.01-100	March 16, 2011
RAI 437 — 06.02.01-101	March 16, 2011

Sincerely

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From: Tesfaye, Getachew [mailto:Getachew.Tesfaye@nrc.gov]
Sent: Wednesday, October 20, 2010 7:18 AM
To: ZZ-DL-A-USEPR-DL
Cc: Jensen, Walton; Jackson, Christopher; McKirgan, John; Carneal, Jason; Colaccino, Joseph; ArevaEPRDCPEm Resource
Subject: U.S. EPR Design Certification Application RAI No. 437 (4953), FSARCh. 6

Attached please find the subject requests for additional information (RAI). A draft of the RAI was provided to you on August 18, 2010, and discussed with your staff on September 30, 2010. Drat RAI Questions 06.02.01-97 and 06.02.01-98 were modified as a result of that discussion. The schedule we have established for review of your application assumes technically correct and complete responses within 30 days of receipt of RAIs. For any RAIs that cannot be answered within 30 days, it is expected that a date for receipt of this information will be provided to the staff within the 30 day period so that the staff can assess how this information will impact the published schedule.

Thanks,
Getachew Tesfaye
Sr. Project Manager
NRO/DNRL/NARP
(301) 415-3361

Hearing Identifier: AREVA_EPR_DC_RAIs
Email Number: 2552

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Subject: DRAFT Response to U.S. EPR Design Certification Application RAI No. 437, FSARCh. 6, Question 6.2.1-99
Sent Date: 2/11/2011 5:33:40 PM
Received Date: 2/11/2011 5:37:38 PM
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Priority: Standard
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Response to

Request for Additional Information No. 437(4953), Revision 1

10/20/2010

U. S. EPR Standard Design Certification
AREVA NP Inc.
Docket No. 52-020
SRP Section: 06.02.01 - Containment Functional Design
Application Section: 6.02.01, 14.03

QUESTIONS for Containment and Ventilation Branch 1 (AP1000/EPR Projects) (SPCV)

Question 06.02.01-99:

Follow-up to RAI 221, Question 06.02.01-23

Supplement 8 response lists compartments that are isolated from the main containment by doors but are connected by vents, drains and penetrations for piping and cable. The volume of these rooms is stated to be included in the calculations for bulk containment pressure.

a. Provide justification that the vents, drains and penetration openings connecting each of these compartments to the bulk containment are adequate to sufficiently equalize before the peak containment pressure is reached for design basis accidents.

b. The "Net Room Volumes" provided in Table 06.02.01-23-1 differs from the values for the compartments provided to the staff in the response to RAI 40. Provide a comparison between the volumes in the two responses. Identify which values are correct and discuss the reasons for which different values were given.

Response to Question 06.02.01-99:

a) Most of the isolated compartments are valve rooms or contain equipment such as heat exchangers. Eight of these compartments (UJA07021, UJA07026, UJA07027, UJA07028, UJA07029, UJA11022, UJA11023, and UJA11024) are lumped together in GOTHIC control volume number 17. These eight compartments are valve rooms or contain heat exchangers, and each compartment contains pipe penetrations providing vent paths to the surrounding areas. Figure 06.02.01-99-1, Figure 06.02.01-99-2, and Figure 06.02.01-99-3 show numerous vent paths connecting these rooms, and this verifies that these compartments will pressurize.

Compartments UJA11025 and UJA11026 are lumped together and form part of GOTHIC control volume number 21. These rooms contain valves, and have vent paths to drain any flooding into the annular space below (see Figure 06.02.01-99-4). These compartments are symmetrical to compartments UJA11027 and UJA11028. The flow paths into the annular space beneath the rooms verify that these rooms will pressurize.

Compartment UJA23042 contains two safety-related doors, +45 ft Door 2 and +45 ft Door 15. Door 2 connects UJA23042 with UJA23019 and will open when there is a 2.90 psi pressure differential from room UJA23019 to UJA23042. Door 15 connects UJA23042 with UJA23014 and will open when there is a 1.45 psi pressure differential from room UJA23014 to UJA23042. During a pressurization of the containment, this compartment will have open vent paths to the annulus area and the pressurizer compartment.

Compartment UJA11021 is a valve room for the fuel pool purification system (FPPS). Figure 06.02.01-99-05 shows several vent paths connecting this compartment to surrounding areas, which verifies that compartment UJA11021 will pressurize during a transient.

Compartment UJA23041 is an instrumentation measuring table room, and Figure 06.02.01-99-6 shows a vent path which is large enough to verify that UJA23041 will pressurize by the time the peak containment pressure occurs.

The remaining compartments listed in the Response to RAI 221, Question 06.02.01-23, which are not explained in this response, as well as the percentage of total Reactor Building (RB) volume for each compartment, are listed in Table 06.02.01-99-1. The total volumes of these compartments only make up 0.692 percent of the total volume of the RB, and the affect of these rooms not pressurizing is minimal.

b) The rooms and volumes shown in Table 06.02.01-23-1 were derived from a RB compartment model created to support subcompartment pressurization analysis. The free volume was calculated using dimensional data obtained from the RB general arrangement drawings. The free volumes of each compartment account for the space occupied by any major equipment and include an occupancy factor of 0.98 to account for the volume taken up by pipes, raceways, structural members, and other unknown equipment.

The rooms and volumes given in the Response to RAI 40, Question 06.02.01-11, were taken from a multi-node model of the RB based on the COCOSYS containment model for OL3. The U.S. EPR GOTHIC multi-node model is based on these values. The GOTHIC multi-node model applies an uncertainty factor of approximately 0.977 to the net free volumes of the COCOSYS control volumes. The free volume values presented in the Response to RAI 40, Question 06.02.01-11 were based on the values from the COCOSYS model without the uncertainty applied.

Table 06.02.01-99-2 lists the values provided in the Response to RAI 40, Question 06.02.01-11 and the values used in the U.S. EPR GOTHIC multi-node model compared to the free volumes from the subcompartment model. The totals are taken excluding the in-containment refueling water storage tank (IRWST) free volume because the free volume of the IRWST fluctuates depending on water level. A comparison between the models shows some differences in volumes in room-to-room comparisons. However, the total free volume of the RB is nearly identical.

FSAR Impact:

The U.S. EPR FSAR will not be changed as a result of this question.

Table 06.02.01-99-1—Isolated Compartments

Room Name	Description	Volume (ft^3)	Percentage of Total Volume
UJA07004	KT (NI DVS) Sump Room	805	0.030
UJA11031	Access to Loop 1 & 2 Area	896	0.033
UJA11032	Access to Loop 3 & 4 Area	896	0.033
UJA15020	Access to Transfer Tube Compartment	2082	0.077
UJA15024	Access to Reactor Cavity	511	0.019
UJA15025	FAL (FPPS) Room	1505	0.056
UJA18020	Corridor	1811	0.067
UJA29023	Access to Emergency Airlock	7373	0.273
UJA34022	JEG (RPS) Valve Room	2805	0.104
Total		**18684**	**0.692**

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
V1 - Spreading Rooms	UJA04002	17655.37	19594.30	UJA04002	23766.48
	UJA07017	2401.13		UJA04003	704.74
V2 - IRWST	UJA04003	53637.01	103396.90	UJA04004	686.38
V3 - Lower Equipment Rooms L1	UJA11002	6899.72	25593.30	UJA04005	1660.14
	UJA11003	7768.36		UJA04006	1660.14
	UJA15002	3548.73		UJA04012	504.19
	UJA15003	7980.23		UJA04013	2598.22
V4 - Lower Equipment Rooms L2	UJA11004	7768.36	24299.70	UJA07001	2137.39
	UJA11005	5840.40		UJA07003	23739.28
	UJA15004	7980.23		UJA07004	804.84
	UJA15005	3283.90		UJA07012	683.02
V5 - Middle Equipment Rooms L1	UJA18002	9004.24	39785.30	UJA07013	11463.99
	UJA18003	8792.37		UJA07014	21126.87
	UJA23002	6754.94		UJA07015	21506.19
	UJA23003	7824.86		UJA07016	21501.54
	UJA23017	6355.93		UJA07017	890.34
	UJA23020	1991.53		UJA07018	9209.97
V6 - Middle Equipment Rooms L2	UJA18004	8792.37	38464.10	UJA07020	3085.47
	UJA18005	8474.58		UJA07021	1172.33
	UJA23004	11052.26		UJA07022	3254.92
	UJA23005	11052.26		UJA07023	2629.15
V7 Upper Equipment	UJA29003	5261.30	37032.50	UJA07024	2783.10

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
Rooms L1 & L2	UJA29004	5261.30		UJA07026	1542.49
	UJA29005	4237.29		UJA07027	1471.09
	UJA34003	9869.35		UJA07028	1584.23
	UJA34004	9869.35		UJA07029	1259.74
	UJA34005	3407.49		UJA11001	207.30
V8 - RPV Pit	UJA11001	3001.41	2932.20	UJA11002	8339.55
V9 - Reactor Cavity	UJA15001	29943.50	50948.56	UJA11003	8654.32
	UJA15017	21751.41		UJA11004	8654.32
	UJA15024	455.51		UJA11005	7376.11
V10 - Lower Equipment Rooms L3	UJA11006	5840.40	24299.70	UJA11006	7250.57
	UJA11007	7768.36		UJA11007	8654.32
	UJA15006	3283.90		UJA11008	8654.32
	UJA15007	7980.23		UJA11009	9070.31
V11 - Lower Equipment Rooms L4	UJA11008	7768.36	25541.60	UJA11010	971.74
	UJA11009	6899.72		UJA11012	653.58
	UJA15008	7980.23		UJA11013	15762.82
	UJA15009	3495.76		UJA11014	10677.04
V12 - Middle Equipment Rooms L3	UJA18006	8474.58	35311.10	UJA11015	12062.92
	UJA18007	8792.37		UJA11016	16195.85
	UJA23006	7824.86		UJA11017	1220.90
	UJA23007	11052.26		UJA11018	9234.26
V13 - Middle Equipment Rooms L4	UJA18008	8792.37	41082.40	UJA11019	5127.41
	UJA18009	7627.12		UJA11020	10469.97

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
	UJA23008	11052.26		UJA11021	1255.54
	UJA23009	6754.94		UJA11022	2052.60
	UJA23018	6355.93		UJA11023	4471.22
	UJA23031	1468.93		UJA11024	2020.49
V14 - Upper Equipment Rooms L3 & L4	UJA29006	4237.29	37032.50	UJA11025	1985.70
	UJA29007	5261.30		UJA11026	1589.87
	UJA29008	5261.30		UJA11027	1589.87
	UJA34006	3407.49		UJA11028	1985.70
	UJA34007	9869.35		UJA11031	895.68
	UJA34008	9869.35		UJA11032	895.68
V15 - Surge Line and Below	UJA11018	9110.17	40696.10	UJA15001	5275.47
	UJA11019	4908.19		UJA15002	3644.82
	UJA15018	4731.64		UJA15003	3630.55
	UJA15019	5568.50		UJA15004	3753.70
	UJA18018	8757.06		UJA15005	4481.12
	UJA18019	8580.51		UJA15006	4481.12
V16 - PZR	UJA23019	6762.01	18921.60	UJA15007	3753.70
	UJA23041	2612.99		UJA15008	3630.55
	UJA29019	5473.16		UJA15009	3644.82
	UJA34019	4519.77		UJA15010	1352.87
V17 - Components	UJA04005	441.38	28387.50	UJA15011	2144.52
	UJA04006	441.38		UJA15012	501.96
	UJA07020	3495.76		UJA15013	16101.23
	UJA07021	1221.75		UJA15014	16827.92
	UJA07022	3142.66		UJA15015	17960.66
	UJA07023	2789.55		UJA15016	20755.09

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
	UJA07024	3319.21		UJA15017	2061.76
	UJA07026	1765.54		UJA15018	4254.68
	UJA07027	1800.85		UJA15019	4934.18
	UJA07028	1553.67		UJA15020	2082.07
	UJA07029	1377.12		UJA15021	2239.40
	UJA11022	2012.71		UJA15023	1161.06
	UJA11023	3495.76		UJA15024	511.15
	UJA11024	2199.86		UJA15025	1505.49
V18 - SG Blowdown	UJA04004	321.33	12346.50	UJA15026	1389.79
	UJA07018	12040.96		UJA15027	1389.79
	UJA07019	275.42		UJA18001	9848.76
V19 - Lower Annulus Rooms L1 & L2	UJA07014	22951.98	22423.00	UJA18002	5455.91
V20 - Lower Annulus Rooms L3 & L4	UJA07015	22951.98	22423.00	UJA18003	6437.21
V21 - Middle Annulus Rooms L1 & L2	UJA11013	10911.02	182406.10	UJA18004	6628.09
	UJA11014	16207.63		UJA18005	6572.70
	UJA11021	1447.74		UJA18006	6572.70
	UJA11025	1945.62		UJA18007	6628.09
	UJA11026	1677.26		UJA18008	6437.21
	UJA11031	741.53		UJA18009	5461.59
	UJA15013	15148.31		UJA18010	1943.56
	UJA15014	17584.75		UJA18011	3143.51
	UJA15020	2330.51		UJA18012	677.29
	UJA15021	9427.97		UJA18013	27636.54
	UJA15025	1666.67		UJA18014	23839.36
	UJA18013	27259.89		UJA18015	26046.39

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
	UJA18014	27718.93		UJA18016	32767.17
	UJA23013	23658.19		UJA18017	7892.52
	UJA23014	24392.66		UJA18018	7563.91
	UJA23042	4590.40		UJA18019	7563.91
V22 - Middle Annulus Rooms L3 & L4	UJA11015	17196.33	176396.70	UJA18020	1811.43
	UJA11016	11970.34		UJA18021	2077.84
	UJA11027	1677.26		UJA18023	2957.49
	UJA11028	1945.62		UJA18026	1929.70
	UJA11032	741.53		UJA18027	1929.70
	UJA15015	18820.62		UJA23001	11467.89
	UJA15016	18926.55		UJA23002	6213.33
	UJA18015	28707.63		UJA23003	7194.53
	UJA18016	29378.53		UJA23004	7407.87
	UJA23015	25105.93		UJA23005	8573.60
	UJA23016	26087.57		UJA23006	8878.33
V23 - Upper Annulus Rooms L1 & L2	UJA29014	31250.00	80170.90	UJA23007	7407.87
	UJA29018	6850.28		UJA23008	7194.53
	UJA34014	34957.63		UJA23009	6213.33
	UJA34018	9004.24		UJA23010	2387.88
V24 - Upper Annulus Rooms L3 & L4	UJA29015	25070.62	63922.90	UJA23011	3577.45
	UJA29022	8121.47		UJA23012	756.97
	UJA34015	24540.96		UJA23013	22312.28
	UJA34022	7697.74		UJA23014	24143.36
V25 - Lower & Upper Dome L1, L2, L3 & L4	UJA15023	278.95	1579198.00	UJA23015	25605.54
	UJA29013	96186.44		UJA23016	24261.49
	UJA29016	106991.50		UJA23017	12696.18
	UJA34104	11052.26		UJA23018	5497.67

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
	UJA34108	11052.26		UJA23019	6450.34
	UJA40001	1390890.00		UJA23020	1554.97
V26 – Access	UJA07013	9745.76	18662.90	UJA23021	2271.79
	UJA11020	9357.35		UJA23023	3189.21
V27 - Staircase (South)	UJA11010	1550.14	13981.60	UJA23026	775.61
	UJA15010	1504.24		UJA23027	775.61
	UJA18010	2161.02		UJA23031	1410.07
	UJA23010	1998.59		UJA23041	2055.30
	UJA29023	7097.46		UJA23042	3272.71
V28 - Staircase (North)	UJA15011	2182.20	12532.70	UJA29003	4992.17
	UJA18011	3135.59		UJA29004	5004.07
	UJA23011	3495.76		UJA29005	3336.12
	UJA29011	2814.27		UJA29006	3514.89
	UJA34011	1200.57		UJA29007	5004.07
V29 – Elevator	UJA04012	233.05	5153.80	UJA29008	4992.17
	UJA07012	628.53		UJA29011	2937.68
	UJA11012	603.81		UJA29012	778.43
	UJA15012	586.16		UJA29013	64373.85
	UJA18012	843.93		UJA29014	25407.59
	UJA23012	942.80		UJA29015	14451.06
	UJA29012	759.18		UJA29016	47590.36
	UJA34012	677.97		UJA29018	7641.44
V30 - Hot Piping Penetrations	UJA07016	22810.73	22285.00	UJA29019	5508.67
				UJA29022	7865.15

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
				UJA29023	7373.14
				UJA29025	573.52
				UJA29026	573.52
				UJA34003	11163.55
				UJA34004	11176.91
				UJA34005	3340.73
				UJA34006	3478.50
				UJA34007	11176.91
				UJA34008	11163.55
				UJA34011	2437.74
				UJA34012	755.91
				UJA34013	100328.08
				UJA34014	37699.46
				UJA34015	29874.34
				UJA34018	9967.05
				UJA34019	3168.14
				UJA34022	2804.55
				UJA34025	603.41
				UJA34026	603.41
				UJA41003	5905.18
				UJA41004	5911.22
				UJA41007	5911.22
				UJA41008	5905.18
				UJA41013	141403.98
				UJA41014	81332.49

Table 06.02.01-99-2—Comparison of Volumes (8 Sheets)

Gothic Control Volume Number and Description	Room Name	Room Free Volume (ft^3)	GOTHIC CV Free Volume (ft^3)	Room Name	Room Free Volume (ft^3)
				UJA41015 UJA40001	76515.37 1061879.82
Total		**2819198.61**	**2805222.46**		**2724668.50**
Total without IRWST		**2765561.60**	**2701825.56**		**2700224.48**

Figure 06.02.01-99-1—Room UJA07026 Vent Paths

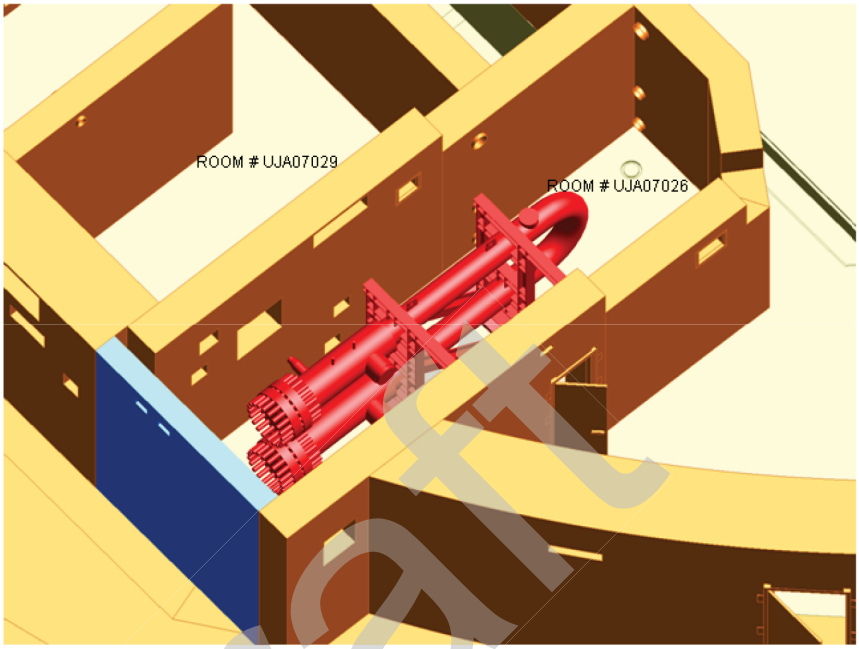

Figure 06.02.01-99-2—Vent Paths for Rooms UJA07028 and UJA07029

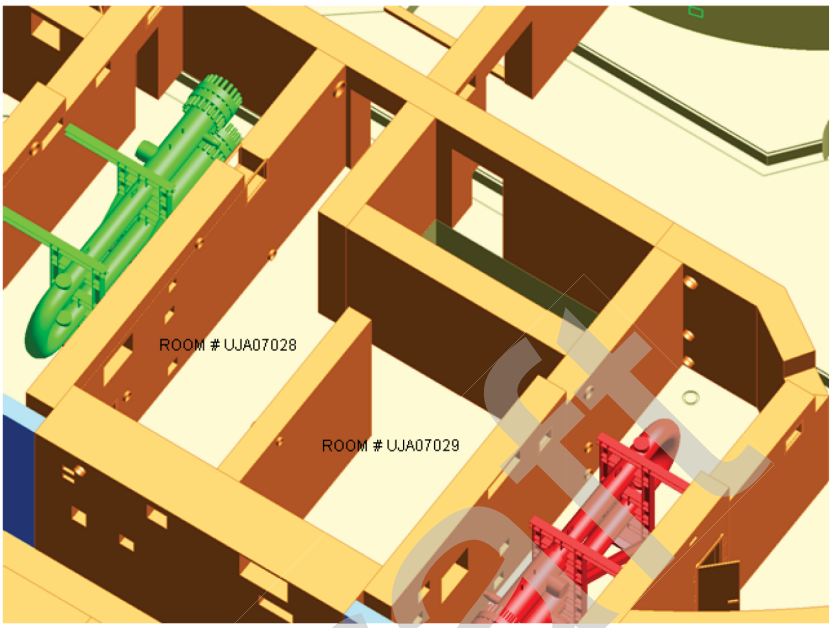

Figure 06.02.01-99-3—Room UJA11023 Vent Paths

Figure 06.02.01-99-4—Vent Paths for Rooms UJA11025 and UJA11026

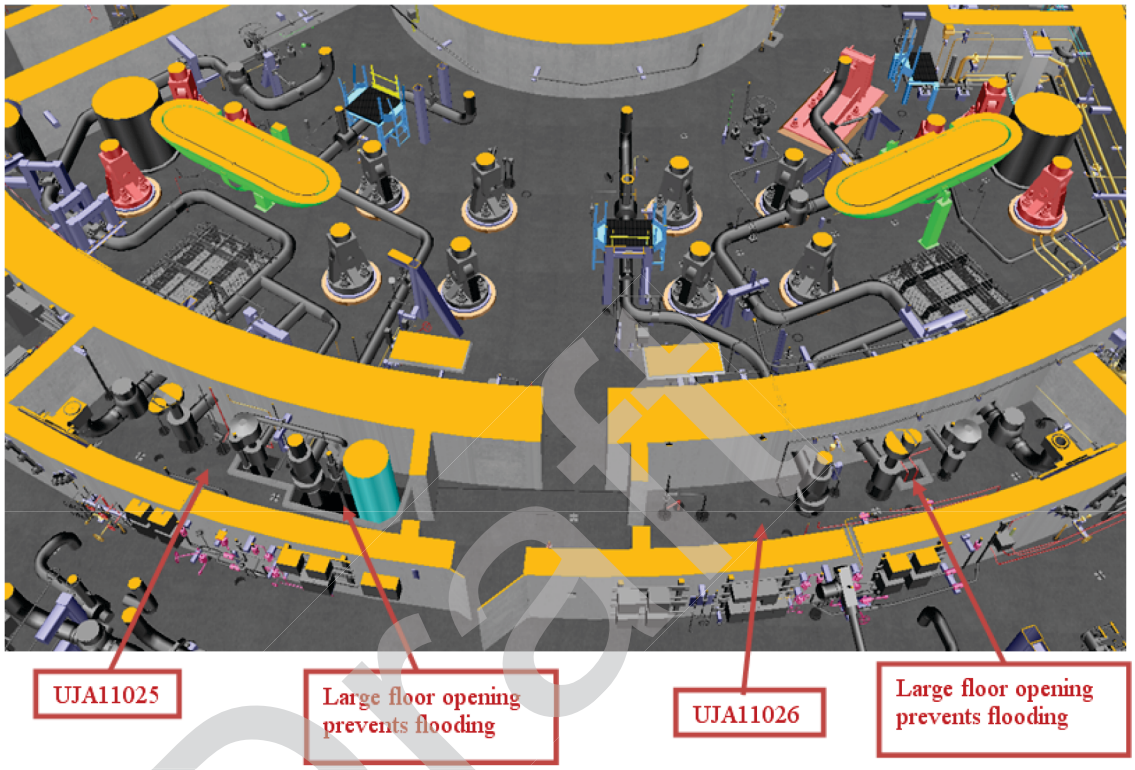

Figure 06.02.01-99-5—Vent Paths for Room UJA11021

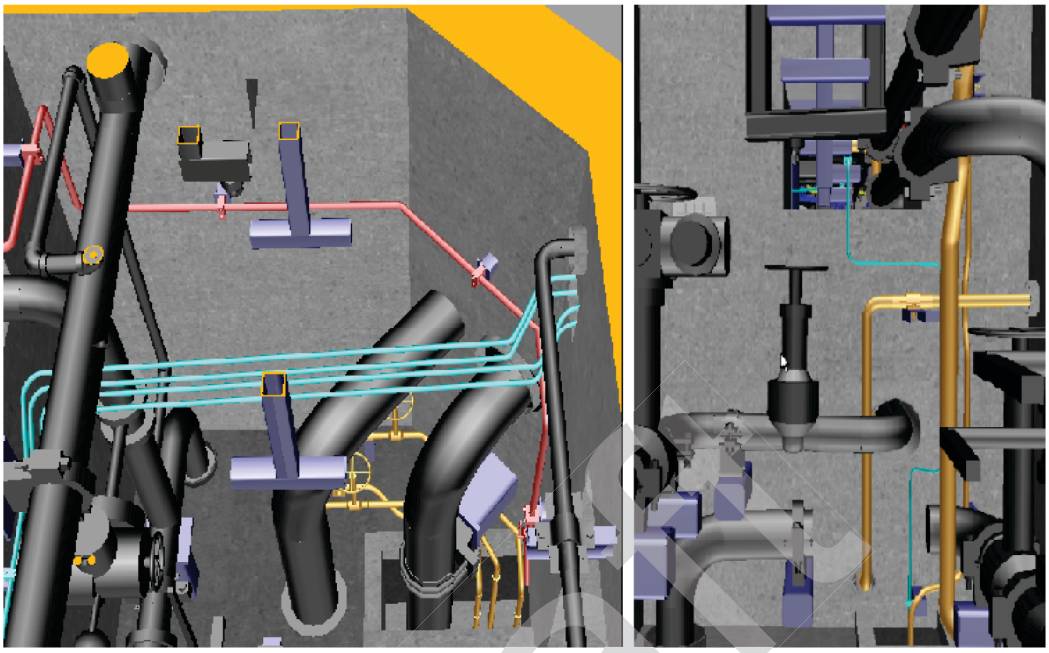

Figure 06.02.01-99-6—Vent Paths for Room UJA23041

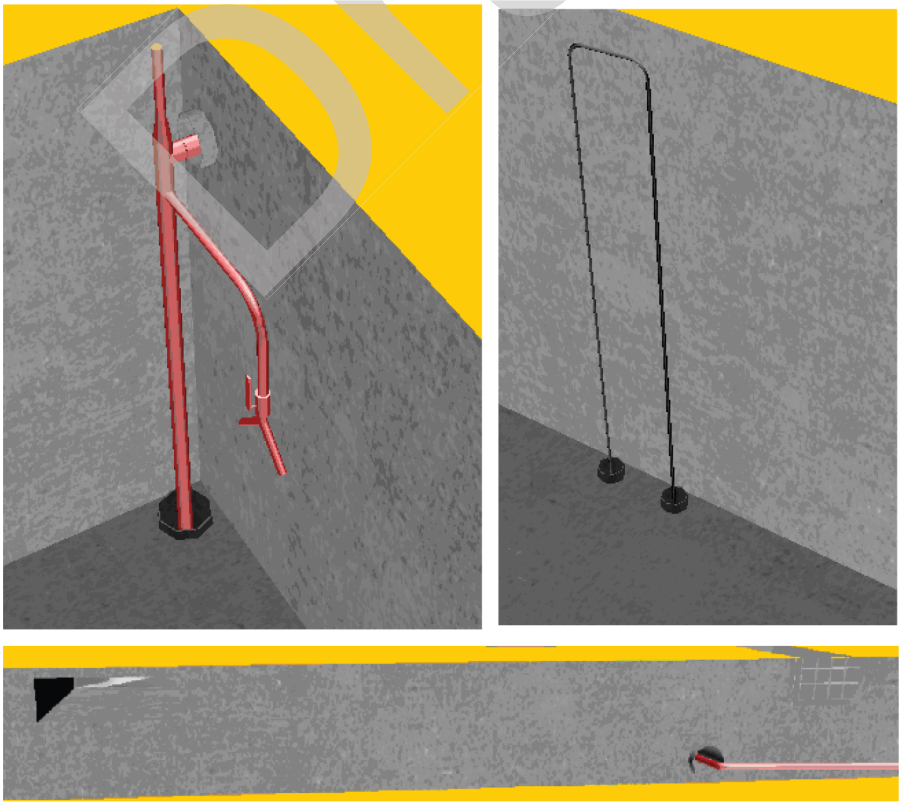

Figure 06.02.01-99-7—Vent Path in Room UJA29022