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MEMORANDUM TO: File

FROM: Stephen Raul Monarque, Project Manager, Section 1
Division of Licensing and Project Management

SUBJECT: NORTH ANNA POWER STATION, UNITS 1 AND 2: ADDITIONAL INFORMATION REGARDING THE PROPOSED TECHNICAL SPECIFICATION CHANGE ON THE CONTROL ROOM EMERGENCY HABITABILITY

On June 13, 2000, Virginia Electric and Power Company (VEPCO) submitted to the staff, for review, notes on calculating the atmospheric dispersion factors for the North Anna Power Station. These factors were calculated using the ARCON 96 computer program. VEPCO provided this information as clarification of a March 16, 2000, submittal.

Docket Nos. 50-338 and 50-339

License Nos. NPF-4 and NPF-7

public

DFO1

Notes for Calculating ARCON96 Atmospheric Dispersion Factors

These comments and tables are being provided to clear up any confusion about how the atmospheric dispersion factors were calculated. There is also a drawing marked up with the approximate location of the source points and receptor points. All runs were modeled as vent releases except for the two auxiliary building to turbine building fresh air intake runs which were modeled as ground level releases.

PORV Designations

For the purposes of this supplement PORV A is the PORV for steam generator loop A. Similarly, PORV B is the PORV for steam generator loop B and PORV C is the PORV for steam generator C.

The affected PORV is PORV A. PORV A produces the highest exhaust flows according to thermal hydraulic calculations. PORV's B and C are the unaffected PORV's because they have smaller exhaust flows than PORV A.

PORV C was not modeled in these calculations. This is because PORV's A and B bound PORV C in proximity to any receptor points.

All the PORV runs were modeled as Unit 1 releases due to the site arrangement.

Use of Turbine Building Fresh Air Louvers as Receptors

The atmospheric dispersion factors computed for an SGTR or MSLB conservatively modeled the turbine building fresh air louvers as receptors for the emergency control room intakes. The turbine building fresh air louvers are possible entry points into the turbine building and the emergency control room air intakes communicate with the turbine building. However, this treatment was conservative because no credit was taken for the dispersion in the turbine building by the turbine building ventilation system.

Use of Extremely Low PORV Vertical Velocities

When determining the vertical velocities to use with both the affected and unaffected PORV's, a very high density was used to produce very low vertical velocities. The use of these extremely low vertical velocities was conservative.

Use of Vent Stack B

Vent stack B was used instead of vent stack A because vent stack B had a lower minimum vertical velocity and because vent stack B is closer to an emergency control room intake than vent stack A. A lower vertical velocity and a shorter distance are both conservative.

TABLE 1
ARCON96 RESULTS - ATMOSPHERIC DISPERSION FACTORS

RUN NAME	0-2 HR	2-8 HR	8-24 HR	24-96 HR	96-720HR	COMMENTS
APNCR	1.00E-07	1.00E-07	1.00E-07	4.79E-06	2.48E-06	
UPNCRA	1.06E-03	7.30E-04	3.24E-04	2.02E-04	1.64E-04	
UPNCRB	1.40E-03	8.95E-04	4.14E-04	2.54E-04	2.02E-04	Used for SGTR**
STNCR	2.56E-03	1.68E-03	6.85E-04	4.48E-04	3.38E-04	
APTFAL6	7.65E-03	5.21E-03	1.86E-03	1.35E-03	1.16E-03	
AUXFAINT+	1.07E-03	9.40E-04	4.27E-04	2.72E-04	2.28E-04	
AUXFAINW+	1.01E-03	6.40E-04	2.56E-04	1.86E-04	1.37E-04	
UPTFAL2	3.88E-03	2.79E-03	7.92E-04	5.95E-04	4.38E-04	
UPTFAL5	5.61E-03	3.31E-03	1.28E-03	9.54E-04	7.58E-04	
UPTFAL6	7.68E-03	5.21E-03	1.83E-03	1.34E-03	1.15E-03	For SGTR & MSLB
STECR1*	1.50E-03	1.23E-03	5.31E-04	3.53E-04	2.48E-04	
STECR2*	3.66E-03	3.06E-03	1.31E-03	8.71E-04	6.17E-04	
STECR3*	7.43E-03	4.73E-03	2.04E-03	1.28E-03	9.84E-04	Used for LOCA
STECR4*	2.72E-03	1.75E-03	7.24E-04	4.62E-04	3.57E-04	
UPECR1*	1.02E-04	5.02E-05	2.47E-05	1.80E-05	1.06E-05	
UPECR2*	1.70E-04	8.70E-05	4.06E-05	2.83E-05	1.90E-05	
UPECR3*	2.95E-04	1.60E-04	7.47E-05	4.53E-05	3.65E-05	
UPECR4*	6.36E-04	4.34E-04	1.94E-04	1.20E-04	9.64E-05	

* - These runs were setup as if the service building roof did not exist and the emergency control room air intakes were open to the air.

+ - These runs were modeled as ground level releases.

** - The 0-2 hour X/Q was used for SGTR no LOOP prior to SI.

TABLE 2
KEY TO THE NAMING OF THE ARCON96 RUNS

The ARCON96 runs made are listed below by file name with a brief description of each run.

APNCR - affected PORV - PORV A - to normal control room intake - The distance used for this run was conservatively set at the minimum distance and direction between the PORV's and the normal control room intake, which were for PORV B.
UPNCRA - unaffected PORV A to normal control room intake - The distance used for this run was the distance from PORV A but the vertical velocity and flow used were for an unaffected PORV. Combined with UPNCRB the limiting unaffected PORV atmospheric dispersion factor to the normal control room intake is determined.
UPNCRB - unaffected PORV B to normal control room intake
STNCR - vent stack B to normal control room intake

APTFAL6 - affected PORV A to turbine building fresh air louver 6

AUXFAINT+ - Auxiliary building to Unit 1 turbine building fresh air intake
AUXFAINW+ - Auxiliary building to Unit 2 turbine building fresh air intake

UPTFAL2 - unaffected PORV B to turbine building intake fresh air louver 2 - This is the louver at frame line 13.
UPTFAL5 - unaffected PORV A to turbine building intake fresh air louver 5 - This is the louver at frame line 5. The distance used for this run was the distance from PORV A but the vertical velocity and flow were for an unaffected PORV.
UPTFAL6 - unaffected PORV A to turbine building intake fresh air louver 6 - This is the louver at frame line 3. The distance used for this run was the distance from PORV A but the vertical velocity and flow were for an unaffected PORV.

STECR1* - vent stack B to emergency control room intake 1 at frame 12
STECR2* - vent stack B to emergency control room intake 2 at frame 10
STECR3* - vent stack B to emergency control room intake 3 at frame 7
STECR4* - vent stack B to emergency control room intake 4 at frame 5

UPECR1* - unaffected PORV B to emergency control room intake 1 at frame 12
UPECR2* - unaffected PORV B to emergency control room intake 2 at frame 10
UPECR3* - unaffected PORV B to emergency control room intake 3 at frame 7
UPECR4* - unaffected PORV B to emergency control room intake 4 at frame 5

* - These runs ignore the service building roof and the geometry is set up as if the service building roof did not exist
+ - These runs were modeled as ground level releases.

Table 3 - Horizontal Distances Between Sources & Receptors

Source:	Receptor:	Distance:
PORV-A*	Normal Control Room Intake	22.4 meters
PORV-B**	Normal Control Room Intake	17.8 meters
PORV-B	Emergency Control Room Intake No. 1 at frame line 12	79.3 meters
PORV-B	Emergency Control Room Intake No. 2 at frame line 10	63.5 meters
PORV-B	Emergency Control Room Intake No. 3 at frame line 7	38.6 meters
PORV-B	Emergency Control Room Intake No. 4 at frame line 5	26.0 meters
Auxiliary Building	Unit 1 Turbine Bldg Fresh Air Intake	73.0 meters
Auxiliary Building	Unit 2 Turbine Bldg Fresh Air Intake	73.0 meters
PORV-B	Unit 2 Turbine Bldg Fresh Air Louver No. 2 at frame line 13	90.6 meters
PORV-A	Unit 1 Turbine Bldg Fresh Air Louver No. 5 at frame line 5	35.9 meters
PORV-A	Unit 1 Turbine Bldg Fresh Air Louver No. 6 at frame line 3	45.9 meters
Vent Stack B	Emergency Control Room Intake No. 1 at frame line 12	51.0 meters
Vent Stack B	Emergency Control Room Intake No. 2 at frame line 10	28.8 meters
Vent Stack B	Emergency Control Room Intake No. 3 at frame line 7	6.4 meters
Vent Stack B	Emergency Control Room Intake No. 4 at frame line 5	31.5 meters
Vent Stack B	Normal Control Room Intake	40.0 meters

* This is the PORV for SG loop A and is the PORV furthest from the normal control room intake

** This is the PORV for SG loop B and is the closest to the normal control room intake

Table 4 - Directions from Receptor to Source (degrees)

Source:	Receptor:	Direction:
PORV-A*	Normal Control Room Intake	180
PORV-B**	Normal Control Room Intake	175
PORV-B	Emergency Control Room Intake No. 1 at frame line 12	85
PORV-B	Emergency Control Room Intake No. 2 at frame line 10	90
PORV-B	Emergency Control Room Intake No. 3 at frame line 7	120
PORV-B	Emergency Control Room Intake No. 4 at frame line 5	180
Auxiliary Building	Unit 1 Turbine Bldg Fresh Air Intake	180
Auxiliary Building	Unit 2 Turbine Bldg Fresh Air Intake	90
PORV-B	Unit 2 Turbine Bldg Fresh Air Louver No. 2 at frame line 13	80
PORV-A	Unit 1 Turbine Bldg Fresh Air Louver No. 5 at frame line 5	145
PORV-A	Unit 1 Turbine Bldg Fresh Air Louver No. 6 at frame line 3	180
Vent Stack B	Emergency Control Room Intake No. 1 at frame line 12	45
Vent Stack B	Emergency Control Room Intake No. 2 at frame line 10	45
Vent Stack B	Emergency Control Room Intake No. 3 at frame line 7	270
Vent Stack B	Emergency Control Room Intake No. 4 at frame line 5	270
Vent Stack B	Normal Control Room Intake	270

* This is the PORV for SG loop A and is the PORV furthest from the normal control room intake

** This is the PORV for SG loop B and is the closest to the normal control room intake

TABLE 5
Vertical Distances Above Grade - 271'

Point of Interest:	Elev	Delta
PORVs	339'	68' 20.7m
Normal Control Room Intake	294.3'	23.3' 7.1m
Emergency Control Room Intake No. 1 At frame line 12	262.5'	-8.5' -2.6m *
Emergency Control Room Intake No. 2 At frame line 10	292'	21' 6.4m
Emergency Control Room Intake No. 3 At frame line 6	287'	16' 4.9m
Emergency Control Room Intake No. 4 At frame line 4	264.67'	-6.3' -1.9m *
Vent Stack A & B	386.75'	115.75' 35.3m
Turbine Bldg. Fresh Air Louvers at frame lines 3, 5 and 13	329.17'	58.17' 17.7m

* - These vertical differences were entered in ARCON96 runs as positive grade elevation differences between source and receptor points.

Table 6
Building Areas for Vent Releases

Building	Building Side	Area
Containment Building	Side facing main steam valve house - area above grade	1500 square meters
Unit 1 Turbine Building	Side which contains air intake	2600 square meters

Table 7
PORV and Vent Stack B Vertical Velocities

Source	Vertical Velocity	Vent Flow	Vent Radius
Vent Stack B	1.47 m/s	5.99 m3/s	1.14 m
Affected PORV-A	31.00 m/s	1.57 m3/s	0.13 m
Unaffected PORV-B	10.00 m/s	0.51 m3/s	0.13 m