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June 4, 2009

Document Control Desk U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Attention: Mr. Jeffery A. Ciocco

Docket No. 52-021 MHI Ref: UAP-HF-09284

Subject: MHI's Responses to US-APWR DCD Draft Open Items RSAC 2.3.4 and RAI No. 42-772.

- **References:** 1) "Draft Open Items RSAC 2.3.4, SRP Section: 02.03.04 Short Term Atmospheric Dispersion Estimates for Accident Releases," dated February 12, 2009.
 - "Request for Additional Information No. 42-772 Revision 0, SRP Section: 02.03.04 – Short Term Atmospheric Dispersion Estimates for Accident Releases, Application Section: DCD Tier 2 Appendix 15A," dated July 30, 2008.

With this letter, Mitsubishi Heavy Industries, Ltd. ("MHI") transmits to the U.S. Nuclear Regulatory Commission ("NRC") documents as listed in Enclosures.

Enclosed are the responses to 7 Draft Open items and amended response to 4 RAIs No. 42-772 Revision 0 contained within References 1 and 2.

Please contact Dr. C. Keith Paulson, Senior Technical Manager, Mitsubishi Nuclear Energy Systems, Inc. if the NRC has questions concerning any aspect of the submittals. His contact information is provided below.

Sincerely,

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Yoshiki Ogata, General Manager- APWR Promoting Department Mitsubishi Heavy Industries, LTD.

Enclosures:

- 1. "Responses to Draft Open Items RSAC 2.3.4 Revision 0"
- 2. "Responses Revision 1 to Request for Additional Information No. 42-772 Revision 0"

CC: J. A. Ciocco

C. K. Paulson

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Docket No. 52-021 MHI Ref: UAP-HF- 09284

Enclosure 1

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UAP-HF-09284 Docket No. 52-021

Response to Draft Open Items RSAC 2.3.4, Revision 0

June, 2009

DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

SRP SECTION:	02.03.04 - Short Term Atmospheric Dispersion Estimates fo Accident Releases				
APPLICATION SECTION:	DCD Tier 2, See	ction 2.3.4			
DATE OF DRAFT OPEN ITEM	S ISSUE:	2/13/2009			

[**Open Item 02.03.04-1**] This question is related to the applicant's responses to RAI 02.03.04-1 and 15.00.03-17.

Justify the methodology used to evaluate doses to the main control room (MRC) and technical support center (TSC) for the failure of small lines carrying primary coolant outside containment accident.

- a. The responses to RAI 02.03.04-1 and 15.00.03-17 state that the TSC dose consequence evaluation for this accident uses atmospheric dispersion factors (χ /Q values) based on the assumption that radioactive materials leaked into the auxiliary building are transferred directly to the TSC through the access building interior door. This implies that the assumed pathway from the reactor coolant spill in the auxiliary building to the TSC is entirely indoors. The use of χ /Q values in a dose consequence evaluation is appropriate only when the release pathway is assumed to travel at least partway outside of any buildings in that χ /Q values account for atmospheric dispersion when the effluent travels outside in the ambient environment. The ARCON96 atmospheric dispersion model accounts for atmospheric turbulence as effluents travel outdoors and are not appropriate for modeling "indoor" transport and dispersion.
- b. Tables 02.03.04-1 and 15.00.03-17-5 seem to indicate that the release pathway for both the MCR and TSC dose consequence evaluations for this accident is the same; i.e., the auxiliary building/reactor coolant system sampling line located within the auxiliary building. This location is shown as "8" in Figures 02.03.04-1 and 15.00.03-17-1. Describe the assumed airborne (outdoor) effluent pathway between reactor coolant spill in the auxiliary building and the MCR. If the reactivity in the spilled reactor coolant is assumed to be discharged to the atmospheric from the plant vent stack for the purposes of modeling MCR doses, then the plant vent should be identified as the release pathway in the tables and figures referenced above.

ANSWER:

a. The application of ARCON96 to indoor dispersion modeling is not appropriate, as you pointed out. Since the sampling system line is the release point in failure of small lines carrying primary coolant outside containment and it does not directly release to the environment, the release point for this event is changed to the plant vent (source "9" in

Figure 02.03.04-6-1 in the answer for Open Item 02.03.04-6) which releases directly to the environment. Similarly, since the air lock and equipment hatch which are the present release points for the fuel handling accident within containment also do not directly release to environment, the release point for this event is also changed to the plant vent.

b. See the above answer "a". In DCD Tier 1 Table 2.1-1, DCD Tier 2 Table 2.0-1 and Table 15A-18 through 15A-23, χ/Q values used for MCR / TSC dose consequence evaluation in failure of small lines carrying primary coolant outside containment and fuel handling accident inside containment will be changed appropriately. Sampling system line, air lock and equipment hatch will be removed from Figure 02.03.04-1 of RAI and Table 02.03.04-1 and Table 2.3-2 of RAI which indicate positional relation between sources and receptors. Dose consequence evaluation in DCD Tier 2 chapter 15 will be revised with the change of χ/Q values.

Impact on DCD

In DCD Tier 1 Table 2.1-1, DCD Tier 2 Table 2.0-1 and Table 15A-18 through 15A-23, χ/Q values used for MCR / TSC dose consequence evaluation in failure of small lines carrying primary coolant outside containment and fuel handling accident inside containment should be changed appropriately. (See Table 02.03.04-6-1 in the answer to Open Item 02.03.04-6, which is the revised one of Table 02.03.04-1 of RAI 02.03.04-1 and Table 2.3-2 and 2.3-3 of RAI 02.03.04-2 and Figure 02.03.04-6-1 in the answer to Open Item 02.03.04-6, which is the revised one of Figure 02.03.04-1 of RAI 02.03.04-1)

Table 02.03.04-6-1 in the answer of Open Item 02.03.04-6 should be added at the end of Section 2.3 in DCD Tier 2. Figure 15A-1 should be revised in DCD Tier 2 as Figure 02.03.04-6-1 in response to Open Item 02.03.04-6.

Dose consequence evaluation in DCD Tier 2 chapter 15 should be revised with the change of χ/Q values.

Impact on COLA

Table of "Key Site Parameter" and Figure of "Site Plan with Release and Intake Locations" in FSAR Chapter 2 will be revised.

Impact on PRA

There is no impact on the PRA.

DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

 SRP SECTION:
 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases

 APPLICATION SECTION:
 DCD Tier 2, Section 2.3.4

 DATE OF DRAFT OPEN ITEMS ISSUE:
 2/13/2009

[**Open Item 02.03.04-2**] This question is related to the applicant's responses to RAIs 02.03.04-1 and 02.03.04-2.

Address the following apparent discrepancies between the information presented in Figure 02.03.04-1 provided in the response to RAI 02.03.04-1 and the information presented in Table 2.3-2 provided in the response to RAI 02.03.04-2:

- a. Table 2.3-2 lists four class 1E electrical room HVAC intakes (i.e., southeast, southwest, northeast, northwest) whereas Figure 02.03.04-1 shows only two class 1E electrical room HVAC intakes.
- b. Table 2.3-2 lists two auxiliary building HVAC intakes (i.e., north, south) whereas Figure 02.03.04-1 shows only one auxiliary building HVAC intake.
- c. Table 2.3-2 lists two containment airlock sources (i.e., north, south) whereas Figure 02.03.04-1 shows only one containment airlock source.

ANSWER:

a. The source and receptor positions shown in Figure 02.03.04-1 of RAI 02.03.04-1 are not all listed. That figure showed only the source and receptor positions of χ/Q used by the radiological consequence in Chapter 15 of DCD. Table 2.3-2 of RAI 02.03.04-2 selected the positional relations between the source and receptor for the COL applicant. Since the focus is different, as previously mentioned, there are some differences between Figure 02.03.04-1 of RAI 02.03.04-1 and Table 2.3-2 of RAI 02.03.04-2.

Table 2.3-2 of RAI 02.03.04-2 and Figure 02.03.04-1 of RAI 02.03.04-1 is revised as the response of Open Item 02.03.04-6. (See the Table 02.03.04-6-1 and Figure 02.03.04-6-1 of the answer of Open Item 02.03.04-6.)

b. This answer is same as above answer "a".

c. As has already been in the answer for Open Item 02.03.04-1, radioactive materials will be emitted through the vent stack in the case of the failure of small lines carrying primary coolant . outside containment accident and therefore, the positional relations between the source and receptor will be reconsidered for the COL applicant. Radioactive materials will be also emitted through the vent stack in the case of the fuel handling accident within containment. For the COL applicant, the relations of location between the sources and receptors of each accident is reconsidered and corrected in Table 02.03.04-6-1 and Figure 02.03.04-6-1, as answer of Open Item 02.03.04-6.

Impact on DCD

In DCD Tier 2 Figure 15A-1, plant north should be added and sampling system line, air lock and equipment hatch should be removed from Figure and Tables which indicate positional relation between sources and receptors. (See Figure 02.03.04-6-1 in the answer to Open Item 02.03.04-6, which is the revised one of Figure 02.03.04-1 of RAI 02.03.04-1)

Figure 15 A-1 in DCD Tier 2 should be revised as Figure 02.03.04-6-1 in the answer to Open Item 02.03.04-6, and Table 02.03.04-6-1 in the answer of Open Item 02.03.04-6 should be added at the end of Section 2.3 in DCD Tier 2.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

 SRP SECTION:
 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases

 APPLICATION SECTION:
 DCD Tier 2, Section 2.3.4

 DATE OF DRAFT OPEN ITEMS ISSUE:
 2/13/2009

[Open Item 02.03.04-3] This question is related to the applicant's response to RAI 02.03.04-2.

- a. Describe the methodology used to determine the initial lateral and vertical diffusion coefficients (i.e., 7.98 meters and 5.03 meters, respectively) presented in the proposed DCD Tier 2 Table 2.3-1 for containment leakage releases. Discuss how this methodology compares to the approach discussed in Sections C.3.2.4.4 and C.3.2.4.5 of RG 1.194.
- b. Describe the methodology used to determine the release height for the area sources (e.g., containment, fuel handling area, equipment hatch, and air lock) presented in the proposed DCD Tier 2 Table 2.3-4. Discuss how this methodology compares to the approach discussed in Section C.3.2.4.5 of RG 1.194 (i.e., the release height for area sources should be set to the vertical center of the area source).
- c. Revise DCD Tier 2 Section 2.3 to include information regarding receptor heights (e.g. the distance above ground level for the main control room HVAC intake, reactor building door, auxiliary building HVAC intake, Class 1E electrical room HVAC intake, technical support center HVAC intake, access building door). These data are required inputs to the ARCON96 atmospheric dispersion model.
- d. Ensure the release height and receptor height data to be presented in DCD Tier 2 Section 2.3 are consistent with the vertical distance data presented in DCD Tier 2 Tables 15A-18 through 15A-23.

ANSWER:

(a)The lateral and vertical diffusion coefficients are determined by the area of area source. The area source in the DCD Tier 2 Table 2.3-1 is determined from cross-sectional area of CV. that is perpendicular to the line of sight from the CV surface above the roof of the reactor building, which is nearest to a intake, toward any control room intake. Because the CV is a circular shape, the cross-sectional area of the CV is common for all receptors which located at different directions. The width and height of the area source (i.e., 47.9 meters and 30.2 meters respectively) are determined from the equivalent rectangular area to the cross-sectional area of the CV (see Fig

02.03.04-3-1). Therefore, the initial lateral and vertical coefficient are determined according to Section C.3.2.4.4. and C.3.2.4.5. of RG 1.194 (i.e., Width and height of area source are divided by 6.).



The ground level is E.L.=2' -8"

Width area source = 157 ft = 47.9 mHeight area source = 99 ft = 30.2 m

Figure 02.03.04-3-1 Area Source for Containment Shell

(b) The height of area source presented in the DCD Tier 2 is determined according to the C.3.2.4.5 of RG 1.194. In other words, the height of area source is set to the vertical center of the area source (see Fig 02.03.04-3-1). The upper and lower height of area source is 212 feet 1.24 inches and 112 feet 11 inches from the ground level, respectively. Therefore the release height for area source is determined to 162 feet 6.12 inches from ground level, which locates at the vertical center of the area source. This height is commonly used for all receptors because the area source for each receptor is same for all receptors (the details are described in the answer of the Open Item 02.03.04-3(a).).

(c) All receptors are assumed to be rectangular. The corner of the rectangular nearest to the source is selected as the location of a receptor for the conservative prediction. The receptor heights are described in Table 02.03.04-3-1 for COL applicants. These receptors are also listed in the Table 0.203.04-6-1 in the answer of Open Item 02.03.04-6, as the combinations of source and receptor for each accident.

Receptors	The height to the lower limit ⁽¹⁾ (m)	The height to the upper limit ⁽¹⁾ (m)						
Main control room HVAC intake (east and west)	14.3 ⁽²⁾	17.1 ⁽³⁾						
Class 1E electrical room HVAC intake (south- east and south-west)	14.3 ⁽²⁾	17.1 ⁽³⁾						
Class 1E electrical room HVAC intake (north- east and north-west)	14.3 ⁽²⁾	16.2 ⁽³⁾						
Reactor building door	7.3 ⁽⁴⁾	9.8 ⁽⁵⁾						
Auxiliary building and technical support center HVAC intake (north and south)	23.2 ⁽²⁾	27.1 ⁽³⁾						

NOTES:

(1) The distance is from the ground level. The ground level is E.L.=2' -8". The receptors are assumed as rectangular, and then the closer corner of receptor height is used to derive the vertical distance between sources and receptors.

(2) For release from main steam line (east) and fuel handling area.

(3) For release from containment, plant vent, main steam line (west), main steam relief valve and main steam safety valve.

(4) For release from fuel handling area.

(5) For release from containment, plant vent, main steam line (east and west), main steam relief valve and main steam safety valve.

(d) The vertical distance data presented in DCD Tier 2 Tables 15A-18 though 15A-23 are determine from the source height and receptor height data presented in DCD Tier 2 Section 2.3. All receptors are assumed to be rectangular as above mentioned (details are described in the answer of the Open Item 02.03.04-3(c)), the vertical distance are determined by using the closer receptor height for each source height. Although the source heights, receptor heights and vertical distances are described Table 02.03.04-6-1 in the answer Open Item 02.03.04-6, These values are the distance differences in a unit of meter from the source to the receptor. The distance differences in a unit of feet are obtained at first and then are rounded off. Those rounded numbers in a unit of feet are converted to in a unit of meter. Note that these values are a bit different from the source height and receptor height in the Table 02.03.04-3-1, because the source height and receptor height in a unit of meter are directly converted from in a unit of feet.

Impact on DCD

Figure 02.03.04.03-1 and Tables 02.03.04.03-1 of this answer of Open Item 02.03.04-3 should be added at Section 2.3 in DCD Tier 2. The content of this answer (i.e. the method of area source and the receptor heights) should be added at Section 2.3 in DCD Tier 2. The lateral and vertical initial diffusion coefficient should be deleted at Table 2.3-1 of RAI 02.03.04-2, because these values are included in Table 02.03.04-6-1, as answer of Open Item 02.03.04-6. The Air lock and

Equipment hatch and Reactor coolant system sample line should be deleted at Table 2.3-4 of RAI 02.03.04-2, as described in the answer of Open Item 02.03.04-1.

The above revised Table 2.3-1 and Table 2.3-4 of RAI 02.03.04-2 should be added in DCD Tier 2.

Impact on COLA

Table of "Key Site Parameter" and Figure of "Site Plan with Release and Intake Locations" in FSAR Chapter 2 will be revised.

Impact on PRA

There is no impact on the PRA.

DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

 SRP SECTION:
 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases

 APPLICATION SECTION:
 DCD Tier 2, Section 2.3.4

 DATE OF DRAFT OPEN ITEMS ISSUE:
 2/13/2009

[Open Item 02.03.04-4] This question is related to the applicant's response to RAI 02.03.04-2.

The last footnotes to proposed DCD Tier 2 Tables 2.3-2 and 2.3-3 are incorrect and should be either revised or deleted.

The footnotes to proposed DCD Tier 2 Tables 2.3-2 and 2.3-3 state the diffusion equations described in ARCON96 (e.g., Revision 1 to NUREG-6331 [sic]) are used for calculating MCR χ/Q values, together with the conservative meteorological condition based on RG 1.194 (e.g., F stability with wind speeds of 1.0 m/s). F stability with a wind speed of 1.0 m/s is a conservative (e.g., 95-percentile) meteorological condition for the Murphy-Camped model discussed in Section C.4 of RG 1.194 but is not a conservative meteorological condition for the ARCON96 atmospheric dispersion model. Although ARCON96 uses a simple Gaussian dispersion model, the concentrations predicted by ARCON96 do not vary inversely with wind speed for all wind speeds because the building wake correction algorithm is not a linear function of wind speed. A plot of ARCON96 χ/Q values as a function of wind speed and stability class, as presented in Figure 1, shows conservative χ/Q values are associated with wind speeds of 3 to 4 m/s.

ANSWER:

The meteorological condition of F stability with 1 m/s is not conservative for the ARCON96 dispersion model as you mention. However in the present analyses the dispersion associated with F stability with 1 m/s is multiplied by a factor of 2. By modifying the χ/Q model in this way the dispersion results envelop most existing plant χ/Q values in US. That is we did not use ARCON96 directly in DCD.

In the Figure 02.03.04-4-1 we have plotted the 0-8 hours ARCON96 dispersion (s/m³) versus slant distance (m) for several wind speeds (m/s) and the values used in this analysis, i.e. 1 m/s with a multiplier of 2. As is shown the variation with the higher wind speeds is less than 15 % as compared with the values used in this analysis. Therefore we believe our modification to the ARCON96 model yields sufficiently conservative results.



Figure 02.03.04-4-1 χ /Q values relate to wind speed

Impact on DCD

The expression "conservative meteorological condition based on RG 1.194", that is the footnotes of Table 2.3-2 and 2.3-3 in RAI 02.03.04-2, should be changed to "meteorological condition based on RG 1.194" for the revised DCD.

The sentence " It is not used the ARCON96 in DCD" should be added in the foot notes of Table 2.3-2 of answer of and answer of RAI 02.03.04-4 for revised DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

SRP SECTION:

02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases

APPLICATION SECTION: DCD Tier 2, Section 2.3.4

DATE OF DRAFT OPEN ITEMS ISSUE: 2/13/2009

[Open Item 02.03.04-5] This question is related to the applicant's response to RAI 02.03.04-2.

Clarify the COL applicant's expectations regarding the site-specific calculation of TSC χ/Q values.

The necessary data for COL applicants to calculate TSC χ/Q values are presented in the proposed DCD Tier 2 Tables 2.3-1, 2.3-3, and 2.3-4. However, there is no combined license information item specifying that COL applicants calculate TSC χ/Q values and there are no TSC χ/Q values listed as key site parameters in either DCD Tier 1 Table 2.1-1 or DCD Tier 2 Table 2.0-1. If it can be demonstrated that the MCR dose consequence model will always be bounding for the TSC, then there is no need for COL applicants to calculate site-specific TSC χ/Q values. However, if the MCR dose consequence model is not bounding for the TSC, then TSC χ/Q values should be included as key site parameters in DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1 and COL applicants should be directed to calculate site-specific TSC χ/Q values for comparison with the TSC χ/Q values listed as key site parameters.

ANSWER:

The same comment was shown in the RAI 15.00.03-25 (RAI No.105-1624) for chapter 15 of DCD of the US-APWR. The answer to the RAI is that the MCR dose consequence model are not bounding for the TSC, therefore the TSC x/Q values will be added to DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1 in DCD.

Impact on DCD

As the answer of RAI 15.00.03-25, Table 2.0-1 in DCD will be revised.

Impact on COLA

Table of "Key Site Parameter" in FSAR Chapter 2 will be revised.

Impact on PRA

There is no impact on the PRA.

DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

SRP SECTION:

02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases

APPLICATION SECTION: DCD Tier 2, Section 2.3.4

DATE OF DRAFT OPEN ITEMS ISSUE: 2/13/2009

[Open Item 02.03.04-6] This question is related to the applicant's response to RAI 02.03.04-3.

Revise the MCR intake and inleakage locations presented in DCD Tier 1 Table 2.1-1, DCD Tier 2 Table 2.0-1, and DCD Tier 2 Tables 15A-18 through 15A-23 as discussed below.

DCD Tier 2 Tables 15A-18 through 15A-23 identify main control room (MCR) intake and inleakage locations for each postulated accident and anticipated operational occurrence. Similarly, DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1 identify inleakage locations for some (but not all) of the postulated accidents and anticipated operational occurrences. The MCR intake and inleakage locations shown in these tables are the bounding locations based, in part, on the results of the "generic" atmospheric dispersion analyses performed by MHI for the purposes of generating x/Q values for use in the MCR dose analyses. These generic atmospheric dispersion analyses varied χ/Q values as a function of downwind distance but did not take into consideration that x/Q values are also a function of wind direction frequency which can vary from site to site. Consequently, COL applicants should be directed to evaluate χ/Q values for each inleakage location (i.e., class 1E electrical room HVAC intake, auxiliary building HVAC intake, and reactor building door) for each accident release point and compare the resulting bounding x/Q values with the corresponding key site parameter values listed in DCD Tier 1 Table 2.1-1 and DCD Tier 2 Table 2.0-1, unless an inleakage location is not a feasible for a particular accident scenario (e.g., a loss-of-coolant accident generates an emergency core cooling system actuation signal which stops the auxiliary building HVAC).

ANSWER:

The DCD will be revised.

We will describe the bounding x/Q's at each inleakage or intake location, based on the "generic" atmospheric dispersion analysis introduced by MHI, for each accident release point. The x/Q's at each receptor will conservatively be set to the largest value determined for the inleakage and intake locations.

Accordingly, COL applicants will be able to compare the resulting bounding x/Q calculated by ARCON96 with the corresponding x/Q listed in DCD. The combination of sources and receptors

are listed in Table 02.03.04-6-1 and Figure 02.03.04-6-1of the answer of Open Item 02.03.04-6. In addition, the locations of the main steam relief valve and the main steam safety valve were displayed by only the location No.5 in Figure 02.03.04-1 of the answer for RAI 02.03.04-1.,In Figure 02.03.04-6-1 of the answer of Open Item 02.03.04-6, they are separately displayed and then they are displayed at 2 locations at the west and the east for the plant north, respectively. Also the main steam line No.4 in RAI02.03.04-1 are displayed at 2 locations similar as the main steam relief valve and the main steam safety valve. Accordingly, all source locations are also displayed additionally in Figure 02.03.04-6-1. In DCD, in case of release from steam line, relief valve and safety valve, the MCR and TSC X/Q values are calculated at only the combination of source and receptor, which has the shortest distance between them. Because in COL the meteorological condition (i.e. wind direction, wind directional frequency, etc.), the all combination of sources and receptors for each sources are added in Table 02.03.04-6-1 of the answer of Open Item 02.03.04-6.

The following tables added on Table 02.03.04-6-1(1) through Table 02.03.04-6-1(7) from Table 02.03.04-1(1) through Table 02.03.04-1(6) of RAI 02.03.04-1 revision 0.are as follows.

- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 2 of 12)
- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 4 of 12)
- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 7 of 12)
- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 8 of 12)
- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 10 of 12)
- Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 12 of 12)
- Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 2 of 8)
- Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 5 of 8)
- Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 6 of 8)
- Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 8 of 8)
- Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 4 of 11)
- Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 7 of 11)
- Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 8 of 11)
- Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 11 of 11)
- Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 2 of 8)
- Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 5 of 8)
- Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 6 of 8)
- Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 8 of 8)

Acci	idents	Steam system piping failure									
	T	McR Main steam line breek releases									
0	Locations ⁽¹⁾	5 of the East	5 of the West	5 of th	e East	(releases	5 of the West	· · · · · · · · · · · · · · · · · · ·			
Sources	Release heights (m)	12.8	26.2	12	12.8		26.2				
		Int	ake			Inleak	r tui				
Receptors Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door			
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b			
	Receptor heights (m)	14.3	17.1	14.3	14.3	16.2	17.1	9.8			
Horizonta Source to R	al distance eceptor (m) ⁽³⁾	17	25	20	17	26	25	33			
Vertical dis	stance (m) (3)	0	-8.8	0	0	-9.8	-8.8	-16			
Straight dis	stance (m) ⁽³⁾	17	26	20	17	28	26	37			
Direction I Source (Receptor to degree) ⁽⁴⁾	256	93	234	256	110	93	132			
Lateral coeffic	diffusion ient (m)	0	0	0	0	0	0	0			
Vertical diffusion		0	0	0	0	0	0	0			
	0-8 hr	1.9	×10 ⁻²	1.9×10 ⁻²							
χ/Q	8-24 hr	1.1:	×10 ⁻²		1.1×10 ⁻²						
(s/m ³) ⁽⁶⁾	24-96 hr	7.1	×10 ⁻³			7.1×10 ⁻³					
	96-720 hr	3.1:	×10 ⁻³	3.1×10 ⁻³							

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 1 of 12)

Acci	dents	Steam system piping failure								
		MCR								
	(1)			Main s	steam line breal	< releases				
Sources	Locations ''	5 of the West	5 of the East	5 of the	e West		5 of the East			
Sources	Release heights (m)	26.2	12.8	26	26.2		12.8			
		Int	ake			Inleak				
Locat	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door		
Receptors		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b		
	Receptor heights (m)	17.1	14.3	16.2	17.1	14.3	14.3	9.8		
Horizonta Source to R	al distance eceptor (m) ⁽³⁾	40	49	41	40	50	49	55		
Vertical dis	tance (m) ⁽³⁾	-8.8	0	-9.8	-8.8	0	0	-2.7		
Straight dis	stance (m) ⁽³⁾	41	49	42	41	50	49	55		
Direction I Source (Receptor to degree) ⁽⁴⁾	269	95	258	269	104	95	118		
Lateral coeffic	Lateral diffusion coefficient (m)		0	0	Ö	0	0	0		
Vertical coeffic	diffusion ient (m)	0	0	0	0	0	. 0	0		
	0-8 hr	1.9:	×10 ⁻²¹	1.9×10 ⁻²						
x/Q	8-24 hr	1.1:	×10 ⁻²	1.1×10 ⁻²						
(s/m ³) ⁽⁶⁾	24-96 hr	7.1	×10 ⁻³			7.1×10 ⁻³				
	96-720 hr	3.1	×10 ⁻³		3.1×10 ⁻³					

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 2 of 12)

Accidents		Steam system piping failure						
			1	MCR				
Sources	Locations (1)	Main 6 of the East (Main steam relief valve)	steam relief valve 7 of the East (Main steam safety valve)	and safety valve 6 of the West (Main steam relief valve)	releases 7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7			
			Ir	ntake				
Basantara	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake			
Receptors		a of the East	a of the East	a of the West	a of the West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal to Red	distance Source ceptor (m) ⁽³⁾	31	26	31	26			
Vertical o	distance (m) ⁽³⁾	-23	-21	-23	-21			
Straight	distance (m) ⁽³⁾	39	33	39	33			
Direction Re (de	eceptor to Source egree) (4)	309	291	51	69			
Lateral diff	usion coefficient (m)	Θ	0	0	0			
Vertical diff	fusion coefficient (m)	.0	0	0	. 0 .			
	0-8 hr		5.3	3×10 ⁻³				
χ/Q	8-24 hr		3.1	1×10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr		2.0	0×10 ⁻³				
	96-720 hr		8.7	7×10 ⁻⁴				

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 3 of 12)

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Accidents		Steam system piping failure						
			Γ	MCR				
Sources	Locations ⁽¹⁾	Main 6 of the West (Main steam relief valve)	steam relief valve 7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	releases 7 of the East (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7			
			lr	ntake				
Descentere	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC	MCR HVAC intake	MCR HVAC intake			
Receptors		a of the East	a of the East	a of the West	a of the West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal to Red	distance Source ceptor (m) ⁽³⁾	48	41	45	41			
Vertical	distance (m) ⁽³⁾	-23	-21	-23	-21			
Straight of	distance (m) ⁽³⁾	53	47	51	47			
Direction Re	eceptor to Source egree) ⁽⁴⁾	294	283	64	77			
Lateral diff	usion coefficient (m)	0	0	0	0			
Vertical diff	Vertical diffusion coefficient		0	0	0			
fait ist for	0-8 hr	o na seu contra contra da esta	5.3	3×10 ⁻³				
χ/Q	8-24 hr		3.1	1×10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr		2.0	0×10 ⁻³				
	96-720 hr		8.7	7×10 ⁻⁴				

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 4 of 12)

٨٥	vidente	Steam system piping failure					
Accidents		MCR					
		Main stea	m relief valve a	and safety valve	e releases		
Sources	Locations	Main steam	e ⊨ast i relief valve)	(Main steam	e East safety valve)		
	Release heights (m) ⁽²⁾	40).5	38	3.7		
Receptors			Inle	eak			
	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾		
		d of the North-East	d of the South-East	d of the North-East	d of the South-East		
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1		
Horizontal dis Recer	stance Source to otor (m) ⁽³⁾	27	31	24	26		
Vertical di	stance (m) (3)	-24	-23	-22	-21		
Straight d	stance (m) ⁽³⁾	36	39	33	33		
Direction Rec (dec	ceptor to Source gree) ⁽⁴⁾	299	309	277	291		
Lateral diffusion	on coefficient (m)	0	0	0	0		
Vertical diffusi	on coefficient (m)	0	0	0	0		
	0-8 hr		5.3×	×10 ⁻³			

3.1×10⁻³

2.0×10⁻³

8.7×10⁻⁴

8-24 hr

24-96 hr

96-720 hr

χ/Q (s/m³) ⁽⁶⁾

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 5 of 12) Accidents Steam system piping failure

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Table 02.03.04-6-1(1) Combination of Sources	and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 6 of 12)	
Accidents	Steam system piping failure	

	Assidents		Steam system piping failure						
		nuents		MCR					
		(1)	M	ain steam re	elief valve a	and safety v	alve releas	es	
		Locations "	6	of the Wes	st	7	of the Wes	st .	
	Sources	Deleges heighte	(Main :	steam relief	valve)	(Main s	team safet	y valve)	
		(m) ⁽²⁾		40.5			38.7		
					Inle	eak			
	Receptors	Locations ⁽¹⁾	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door	
2.3.4			d of the North- West	d of the South- West	b	d of the North- West	d of the South- West	b	
-20		Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8	
	Horizontal dis Recer	Horizontal distance Source to Receptor (m) ⁽³⁾		31	24	24	26	24	
	Vertical di	stance (m) (3)	-24	-23	-30	-22	-21	-29	
	Straight di	stance (m) (3)	36	39	39	33	33	38	
	Direction Rec (deg	Direction Receptor to Source (degree) ⁽⁴⁾		51	88	83	69	101	
	Lateral diffusion	on coefficient (m)	0	0	0	0	0 .	0	
e de la composición de	Vertical diffusi	on coefficient (m)	0 .			0 0	0	0	
		0-8 hr			5.3×	10 ⁻³			
	X/Q	8-24 hr		AND MA AND 0 A	3.1×	:10 ⁻³			
	(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	:10 ⁻³			
		96-720 hr			8.7×	:10 ⁻⁴			
	· · · · · · · · · · · · · · · · · · ·	•							

Accidents		Steam system piping failure						
		MCR						
Sources	Locations ⁽¹⁾	Main stea 6 of th (Main steam	am relief valve a e West i relief valve)	and safety valve 7 of th (Main steam	d safety valve releases 7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40).5	38.7				
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾			
		d of the North-East	d of the South-East	d of the North-East	d of the South-East			
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1			
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	44	48	41	41			
Vertical dist	ance (m) ⁽³⁾	-24	-23	-22	-21			
Straight dist	tance (m) ⁽³⁾	51	53	46	47			
Direction Rece (degr	Direction Receptor to Source (degree) ⁽⁴⁾		294	274	283			
Lateral diffusior	n coefficient (m)	0	0	0	0			
Vertical diffusior	n coefficient (m)	0	0	0	0			
	0-8 hr		5.3×	10 ⁻³				
x/Q	8-24 hr		3.1×	10 ⁻³				
(s/m³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³				
	96-720 hr		8.7×	:10 ⁻⁴				

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Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 7 of 12)

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Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 8 of 12)

Accio	Steam system piping failure								
7,0010		MCR							
Sources	Locations ⁽¹⁾	Ma 6 (Mains)	ain steam re 5 of the Eas steam relief	elief valve a t valve)	nd safety valve releases 7 of the East (Main steam safety valve)				
	Release heights (m) ⁽²⁾		40.5			38.7			
				Inle	eak				
Receptors	Locations ⁽¹⁾	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door		
		d of the North- West	d of the South- West	b	d of the North- West	d of the South- West	b		
	Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8		
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	42	45	41	41	41	41		
Vertical dist	ance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29		
Straight dist	ance (m) ⁽³⁾	49	51	51	46	47	50		
Direction Receptor to Source (degree) ⁽⁴⁾		72	64	89	86	77	97		
Lateral diffusion	coefficient (m)	0	0	0	0	0	0		
Vertical diffusior	n coefficient (m)	0	0 0	, 0 .	0	0	0		
	0-8 hr			5.3×	10 ⁻³	I	·		
χ/Q	8-24 hr			3.1×	:10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	10 ⁻³				
	96-720 hr			8.7×	:10⁴	n fan fan skalen en sen sen sen sen sen sen sen sen se			

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able v2.v3.v4-o-1(1) Combination of Sources and Receptors for Steam System Piping Panure Analysis in the DCD (Sheet 9	CD (Sheet 9 of	vsis in the DCD (Failure Analys	Piping Fa	System P	r Steam S	eceptors fo	Sources and R	ibination of a	I) Com	4-6-1(1)	le 02.03.0	ĩab
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$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						ccidents	Ac Ac		
\mathbb{N}_{3}			break releases	Main steam line		Locations (1)			
ReceptorsLocations (1)IntakeIntakeIntakeInteakReceptorsLocations (1)TSC HVAC intakeTSC HVAC intakeAuxiliary building HVAC intakeAuxiliary building HVAC intakeAuxiliary building HVAC intakeReceptor heights (m) (2)27.127.127.127.1Horizontal distance to Intake (m) (3)84678467Vertical distance (m) (3)0000Straight distance (m) (3)84678467Direction Receptor to Source (degree) (4)135118135118Lateral diffusion coefficient (m)00000		26.2				Release heights (m) ⁽²⁾	Sources		
ReceptorsLocations (1)TSC HVAC intakeTSC HVAC intakeAuxiliary building HVAC 	· .	eak	Inle	ake	Inta				
$\frac{1}{3}$ $\frac{1}$		Auxiliary building HVAC intake	Auxiliary building HVAC intake	TSC HVAC intake	TSC HVAC intake	Locations ⁽¹⁾	Receptors		
$\frac{\frac{Receptor}{heights (m)^{(2)}}}{\frac{1000}{27.1}} \frac{27.1}{27.1} \frac{27.1}{27.1} \frac{27.1}{27.1} \frac{27.1}{27.1}$		c of the South	c of the North	c of the South	c of the North		receptore		
$\frac{1}{3}$ Horizontal distance to Intake (m) ⁽³⁾ Vertical distance (m) ⁽³⁾ Vertical distance (m) ⁽³⁾ Vertical distance (m) ⁽³⁾ Straight distance (m) ⁽³⁾ Straight distance (m) ⁽³⁾ At the second		27.1	27.1	27.1	27.1	Receptor heights (m) ⁽²⁾			
$\frac{Vertical \ distance \ (m)^{(3)}}{Straight \ distance \ (m)^{(3)}} \frac{0}{84} \frac{0}{67} \frac{0}{84} \frac{67}{67}$ $\frac{Direction \ Receptor \ to \ Source}{(\ degree)^{(4)}} \frac{135}{118} \frac{118}{135} \frac{118}{118}$ $\frac{Lateral \ diffusion}{coefficient \ (m)} \frac{0}{0} \frac{0}{0} \frac{0}{0}$		67	84	67	84	tal distance to ake (m) ⁽³⁾	Horizont Inta		2.0
Straight distance $(m)^{(3)}$ 84678467Direction Receptor to Source (degree)^{(4)}135118135118Lateral diffusion coefficient (m)0000		0	0	0	0	distance (m) ⁽³⁾	Vertical o	3. 	
Direction Receptor to Source (degree) (4)135118135118Lateral diffusion coefficient (m)0000Vertical diffusion0000		67	84	67	84	Straight distance (m) ⁽³⁾ Direction Receptor to Source (degree) ⁽⁴⁾		-223	
Lateral diffusion 0 0 0 coefficient (m) 0 0 0		118	135	118	135				
Vertical diffusion		0	0	0	0	al diffusion ficient (m)	Latera coeff		
coefficient (m) 0 0 0 0		0	0	0	0	al diffusion	Vertic coeff	• •	
0-8 hr 1.5×10^{-3} 1.5×10^{-3}		10 ⁻³	1.5×	10 ⁻³	1.5×	0-8 hr			
χ/Q 8-24 hr 8.4×10 ⁻⁴ 8.4×10 ⁻⁴		10⁻⁴	8.4×	10⁴	8.4×	8-24 hr	χ/Q		
$(s/m^3)^{(6)}$ 24-96 hr 5.3×10 ⁻⁴ 5.3×10 ⁻⁴		104	5.3×	10 ⁻⁴	5.3×	24-96 hr	(s/m ³) ⁽⁶⁾		
96-720 hr 2.3×10 ⁻⁴ 2.3×10 ⁻⁴		10 ⁻⁴	2.3×	10⁴	2.3×	96-720 hr			

Table 02.03.04-6-1(1) Combination of Sources an	d Receptors for Steam System Pipin	g Failure Analysis in the DCD	(Sheet 10 of 12)
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	Δ	cidents		Steam systen	n piping failure			
				TS	SC			
	- Courooo	Locations (1)		Main steam line 5 of th	e break releases le East			
	Sources	Release heights (m) ⁽²⁾		12	8			
		,	Inta	ake	Inle	eak		
	Receptors Receptor Receptor heights (m) ⁽²⁾		TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake		
			c of the North	c of the South	c of the North	c of the South		
			23.2	23.2	23.2	23.2		
	Horizon Inta	tal distance to ake (m) ⁽³⁾	104	91	104	91		
	Vertical	distance (m) ⁽³⁾	10	10	10	10		
	Straight	distance (m) ⁽³⁾	105	91	105	91		
	Direction Ro	eceptor to Source egree) ⁽⁴⁾	127	113	127	113		
	Later coel	al diffusion ficient (m)	0 .	0	0	0		
	Vertic coel	cal diffusion ficient (m)	0	0	0	0		
	-	0-8 hr	1.5×	10 ⁻³	1.5×	·10 ⁻³		
	x/Q	8-24 hr	8.4×	:10 ⁻⁴	8.4×	×10 ⁻⁴		
n a sharan n	(s/m ³) ⁽⁶⁾	24-96 hr	5.3×	10 ⁻⁴	5.3×	×10 ⁻⁴		
		96-720 hr	2.3×	:10 ⁻⁴	2.3×	×10 ⁻⁴		

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Ace	cidents				Steam system	n piping failure)		
					T	SC			
				Main stean	n relief valve a	nd safety valve releases			
Sources	Locations ⁽¹⁾	6 of the West (Main steam relief valve)		(Main steam safety valve)		6 of the West (Main steam relief valve)		/ of the vvest (Main steam safety valve)	
	Release heights (m) ⁽²⁾	4().5	38	3.7	4().5	38	3.7
			Inta	ake			Inle	eak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizontal distance Source to Receptor (m) ⁽³⁾		69	60	72	61	69	60	72	61
Vertical di	stance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11
Straight di	istance (m) ⁽³⁾	70	61	73	62	70	61	73	62
Direction Source	Receptor to (degree) (4)	121	98	125	103	121	98	125	103
Lateral diffu	sion coefficient (m)	0	0	0	0	0	0	0	0
Vertica coeffi	l diffusion cient (m)	0	0	0	0	0	0	0	0
	0-8 hr		1.7×	:10 ⁻³			1.7×	10 ⁻³	·
χ/Q	8-24 hr		9.9×	10-4			9.9×	10⁴	
(s/m ³) ⁽⁶⁾	24-96 hr		6.3×	·10 ⁻⁴			6.3×	10-4	
	96-720 hr		2.8×	:10 ⁻⁴			2.8×	10-4	

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Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 11 of 12)

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Acc					Steam system	n piping failure			/
					TS	SC			
				Main stean	n relief valve a	nd safety valv	e releases		
Sources	Locations ⁽¹⁾	6 of the East (Main steam relief valve)		/ of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)	
	Release heights (m) ⁽²⁾	40	0.5	38	3.7	40	0.5	38	3.7
			Inta	ake			Inle	eak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizontal d to Rece	istance Source eptor (m) ⁽³⁾	84	76	86	77	84	76	86	77
Vertical di	stance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11
Straight di	istance (m) ⁽³⁾	85	77	87	78	85	77	87	78
Direction Source	Receptor to (degree) (4)	115	96	119	100	115	96	119	100
Lateral diffu	sion coefficient (m)	0	0	0	0	0	0	0	0
Vertica coeffi	I diffusion cient (m)	0	0	0	0	0	0	0	0
	0-8 hr		1.7×	:10 ⁻³			1.7×	10 ⁻³	
χ/Q	8-24 hr		9.9×	:10 ⁻⁴		9.9×10 ⁻⁴			-
$(s/m^3)^{(6)}$	24-96 hr		6.3×	:10 ⁻⁴			6.3×	10 ⁻⁴	<u></u>
	96-720 hr		2.8×	:10 ⁻⁴			2.8×	10 ⁻⁴	

Table 02.03.04-6-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 12 of 12)

Δ	ccidents		RCP rotor se	izure accident				
			M	CR				
		Main st	eam relief valve a	nd safety valve re	eleases			
	Locations (1)	6 of the East	7 of the East	6 of the West	7 of the West			
Sources		(Main steam	(IVIain steam	(Main steam	(Main steam			
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7			
		Intake						
Decentero	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake			
Receptors		a of the East	a of the East	a of the West	a of the West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal distance Source to Receptor (m) ⁽³⁾		31	26	31	26			
Vertical distance (m) ⁽³⁾		-23	-21	-23	-21			
Straight	distance (m) ⁽³⁾	39	33	39	33			
Directio Source	n Receptor to e (degree) ⁽⁴⁾	309	291	51	69			
Lateral diff	usion coefficient (m)	0	0	0	0			
Vertic coef	al diffusion ficient (m)	0	0	0	0			
	0-8 hr		5.3×	:10 ⁻³	ι <u></u>			
x/Q	8-24 hr	3.1×10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³				
	96-720 hr		8.7×	:10 ⁻⁴				

Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 1 of 8)

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	ccidents		RCP rotor set	izure accident					
			M	CR					
		Main st	eam relief valve a	nd safety valve r	eleases				
Sources	Locations ⁽¹⁾	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)				
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7				
			Intake						
Becontor	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake				
Receptors		a of the East	a of the East	a of the West	a of the West				
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1				
Horizonta to Re	distance Source ceptor (m) ⁽³⁾	48	41	45	41				
Vertical	distance (m) ⁽³⁾	-23	-21	-23	-21				
Straight	distance (m) (3)	53	47	51 -	47				
Directio Sourc	on Receptor to e (degree) ⁽⁴⁾	294	283	64	77				
Lateral dit	fusion coefficient (m)	0	0 ·	0 .	0				
Verti coe	cal diffusion fficient (m)	0	0	0	0				
	0-8 hr		5.3×	10 ⁻³					
χ/Q	8-24 hr	3.1×10 ⁻³							
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³					
	96-720 hr		8.7×	:10 ⁻⁴					

Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 2 of 8)

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Table 02.03.04-6-1	2) Combination	of Sources and I	Receptors for I	RCP Roto	or Seizure A	nalysis in the	DCD (Sheet 3 of 8)	

	Δοοίν	donte		RCP rotor sei	zure accident	
				M	CR	
		Locations (1)	Main stea 6 of th	m relief valve a e East	nd safety valve 7 of th	releases e East
			(Main steam	relief valve)	(Main steam	safety valve)
50	ources	Release heights (m)	40).5	38	.7
				Inle	eak	
Re	centors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾
	ooptoro		d of the North-East	d of the South-East	d of the North-East	d of the South-East
		Receptor heights (m)	16.2	17.1	16.2	17.1
Hori	Horizontal distance Source to Receptor (m) ⁽³⁾		27	31	24	26
	Vertical distance (m) (3)		-24	-23	-22	-21
St	traight dis	tance (m) ⁽³⁾	36	39	33	33
Г	Direction F Source (c	Receptor to legree) ⁽⁴⁾	299	309	277	291
Late	eral diffusi (n	on coefficient n)	0	0	0	0
Vert	tical diffus (n	ion coefficient n)	0	0	0	0
				5.3×	10 ⁻³	2.11.
	χ/Q	8-24 hr		3.1×	10 ⁻³	
(s)	/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³	
		96-720 hr		8.7×	10-⁴	

Ac	Accidents			RCP rotor s	eizure accide	nt	••••••	
Act				N	/ICR			
Sources	Locations (1)	(Main	Main stear 6 of the West steam relief	n relief valve t valve)	and safety valve_releases 7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾		38.7					
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Ir Reactor building door	leak Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	
		d of the North- West	d of the South- West	b	d of the North- West	d of the South- West	b	
Receptor heights (m) ⁽²⁾		16.2	17.1	9.8	16.2	17.1	9.8	
Horizontal distance Source to Receptor (m) ⁽³⁾		27	31	24	24	26	24	
Vertical di	stance (m) (3)	-24	-23	-30	-22	-21	-29	
Straight d	istance (m) ⁽³⁾	36	39	39	33	33	38	
Direction Source	Receptor to (degree) ⁽⁴⁾	61	51	88	83	69	101	
Lateral diffu	Lateral diffusion coefficient		0	0	0	0	0	
Vertical diffu	Vertical diffusion coefficient		0	0	0	· 0 ·	0	
·	0-8 hr			5.3	8×10 ⁻³			
χ/Q	8-24 hr			3.1	×10 ⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr			2.0)×10 ⁻³			
	96-720 hr			8.7	′×10 ⁻⁴			

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Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 4 of 8)

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Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 5 of 8)

Acci	dents		RCP rotor s	eizure accider	nt			
			N	/ICR				
	Locations ⁽¹⁾ 6 of the West 7 of the West (Main steam relief valve) (Main steam safety valve)				lve_releases the West m safety valve)			
Sources	Release heights (m)	4().5	38.7				
			Inleak					
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾			
		d of the North-East	d of the South-East	d of the North-East	d of the South- East			
	Receptor heights (m)	16.2	. 17.1	16.2	17.1			
Horizontal dis to Recep	Horizontal distance Source to Receptor (m) ⁽³⁾		48	41	41			
Vertical dis	tance (m) (3)	-24	-23	-22	-21			
Straight dis	tance (m) ⁽³⁾	51	53	46	47			
Direction F Source (d	Receptor to degree) ⁽⁴⁾	287	294	274	283			
Lateral diffus	ion coefficient n)	0	0	0	0			
Vertical diffus (r	ion coefficient n)	0	0	0	0			
	0-8 hr		5.3	3×10 ⁻³				
X/Q	8-24 hr		3.1	1×10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr		2.0)×10 ⁻³				
	96-720 hr		8.7	′×10 ⁻⁴				

Accidents		RCP rotor seizure accident							
		MCR							
Sources	Locations ⁽¹⁾	(Main	Main steam 6 of the East steam relief	relief valve a valve)	and safety valve_releases 7 of the East (Main steam safety valve)				
	Release heights (m) ⁽²⁾		40.5		38.7				
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	Inle Reactor building door	eak Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	Reactor building door		
	Receptor	North- West 16.2	South- West 17.1	9.8	North- West 16.2	South- West 17.1	b 9.8		
Horizontal distance Source to Receptor (m) ⁽³⁾		42	45	41	41	41	41		
Vertical distance (m) (3)		-24	-23	-30	-22	-21	-29		
Straight distance (m) (3)		49	51	51	46	47	50		
Direction Receptor to Source (degree) ⁽⁴⁾		72	64	. 89	86	77	97		
Lateral diffusion coefficient (m)		0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	0	0		
X/Q (s/m ³) ⁽⁶⁾	0-8 hr	5.3×10 ⁻³							
	8-24 hr	3.1×10 ⁻³							
	24-96 hr	2.0×10 ⁻³							
	96-720 hr	8.7×10 ⁻⁴							

Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 6 of 8)

Table	2.00.04 0 1			s and Recept		otor ocizure	Analysis in ti	le DOD (Silee			
Accidents		RCP rotor seizure accident									
		TSC									
Sources -	Locations	Main steam relief valve and safety valve releas									
		6 of the West		7 of the West		6 of the West		7 of the West			
		(Main steam relief valve)		(Main steam safety valve)		(Main steam relief valve)		(Main steam safety valve)			
	Release	40.5		38.7		40.5		38.7			
	(m) ⁽²⁾										
Receptors	Locations	Intake				Inleak					
		TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake		
		c of the	c of the	c of the	c of the	c of the	c of the	c of the	c of the		
		North	South	North	South	North	South	North	South		
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1		
Horizontal distance Source to Receptor (m) ⁽³⁾		69	60	72	61	69	60	72	61		
Vertical distance (m) (3)		-13	-13	-11	-11	-13	-13	-11	-11		
Straight distance (m) (3)		70	61	73	62	70	61	73	62		
Direction Receptor to Source (degree) ⁽⁴⁾		121	98	125	103	121	98	125	103		
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	• 0	0	0	0		
χ/Q (s/m ³) ⁽⁶⁾	0-8 hr		1.7×10 ⁻³				1.7×10 ⁻³				
	8-24 hr	9.9×10 ⁻⁴				9.9×10⁻⁴					
	24-96 hr		6.3×	÷10 ⁻⁴		6.3×10 ⁻⁴					
	96-720 hr		2.8×	÷10 ⁻⁴		2.8×10 ⁻⁴					

Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 7 of 8)
Table 02.03.04-6-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 8

Acci	dente	RCP rotor seizure accident										
					Τξ	SC						
	Locations			Main stear	n relief valve a	and safety valve releases						
	(1)	6 of th	e East	7 of th	/ of the East		e East	7 of th	e East			
Sources	Balanaa	(Iviain steam	relier valve)	(Main steam salety valve)		(Iviain steam	rellet valve)	(Main steam	safety valve)			
	heights (m) ⁽²⁾	4(0.5	38.7		40.5		38.7				
		<u> </u>	Inta	ake			Inle	eak	-			
Receptors	Locations	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake			
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South			
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1			
Horizontal distance Source to Receptor (m) ⁽³⁾		84	76	86	77	84	76	86	77			
Vertical dis	tance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11			
Straight dis	tance (m) ⁽³⁾	85	77	87	78	85	77	87	78			
Direction Receptor to Source (degree) ⁽⁴⁾		115	96	119	100	115	96	119	100			
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0			
Vertical coeffici	diffusion ient (m)	0 0		0	0	0	0 0	0				
	0-8 hr		1.7×	×10 ⁻³			1.7>	<10 ⁻³				
x/Q	8-24 hr		9.9×	×10 ⁻⁴		9.9×10 ⁻⁴						
(s/m ³) ⁽⁶⁾	24-96 hr		6.3×	×10 ⁻⁴			6.3×	<10 ⁻⁴				
	96-720 hr		2.8×	×10 ⁻⁴		•·	2.8>	<10 ⁻⁴				

3. 1

Table	02.03.04-0-1(3)	Sombinatic		co una ricec				ilysis in the	DOD JUlleet				
Δ	rcidents				Ro	d Ejection Ac	cident						
						MCR							
	Locations ⁽¹⁾					Plant vent							
	Locations					9							
Sources	Release heights (m)		69.8										
		Intake Inleak											
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door			
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b			
	Receptor heights (m)	17.1	17.1	16.2	17.1	16.2	17.1	27.1	27.1	9.8			
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	68	56	63	68	. 50	56	55	60	37			
Vertical	distance (m) (3)	-52	-52	-53	-52	-53	-52	-43	-43	-60			
Straight	distance (m) ⁽³⁾	86	77	83	86	73	77	69	74	71			
Directio Source	n Receptor to e (degree) ⁽⁴⁾	321	21	317	321	24	21	92	65	33			
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0	0			
Vertic coef	al diffusion ficient (m)	0	0	0	0	0	0	0	0	0			
	0-8 hr	1.1×	10 ⁻³			•	1.4×10 ⁻³						
x/Q	8-24 hr	6.6×	×10 ⁻⁴				8.0×10 ⁻⁴						
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	:10 ^{-₄}				5.1×10 ⁻⁴						
	96-720 hr	1.9×	:10 ^{-₄}				2.2×10 ⁻⁴						

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 2 of 11)

Accidents					Rod	Ejection Acc	ident					
						MCR		76				
	(1)	Ground level containment release point ⁽⁹⁾										
C	Locations ''	2 of the	2 of the	1 of the	2 of the	1 of the	2 of the	3 of the	3 of the	4		
Sources	Release	Easi	vvesi		Easi	vvest	vvest					
	heights (m) (2)			-		49.4						
		Inta	ake				Inleak					
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door		
		a of the East	a of the West	d of the North-East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b		
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1	27.1	27.1	9.8		
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	32	32	27	32	27	32	44	46	17		
Vertical o	listance (m) ⁽³⁾	-32	-32	-33	-32	-33	-32	-22	-22	-39		
Straight o	distance (m) ⁽³⁾	45	45	42	45	42	45	49	51	43		
Direction Source	n Receptor to e (degree) ⁽⁴⁾	325	35	320	325	40	35	98	75	53		
Lateral diff	usion coefficient (m)	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98		
Vertic coeff	al diffusion ficient (m)	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03		
	0-8 hr	2.2×	10 ⁻³				2.4×10 ⁻³		·····			
x/q	8-24 hr	1.3×	10 ⁻³				1.4×10 ⁻³					
(s/m ³) ⁽⁶⁾	24-96 hr	8.3×	10 ^{-₄}				9.1×10 ⁻⁴					
	96-720 hr	3.6×	10⁴				4.0×10 ⁻⁴					

		Pad Extended and Activity of an and Dob (Sileet 3 of 11)								
Acci	idents		Rod Ejecti	on Accident						
			M	CR						
	Locations		Main steam relief valve a	and safety valve releases						
		6 of the East	7 of the East	6 of the West	7 of the West					
Sourcos		(Main steam relief valve)	(Main steam safety valve)	(Main steam relief valve)	(Main steam safety valve)					
Sources	Release									
	heights (m)	40.5	38.7	40.5	38.7					
	(2)									
			Int	ake						
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake					
Receptors		a of the East	a of the East	a of the West	a of the West					
	Receptor heights (m)	17.1	17.1	17.1	17.1					
Horizonta Source to (m	al distance o Receptor 1) ⁽³⁾	31	26	31	26					
Vertical dis	tance (m) ⁽³⁾	-23	-21	-23	-21					
Straight dis	tance (m) ⁽³⁾	39	33	39	33					
Direction I Source (Receptor to degree) ⁽⁴⁾	309	291	· 51	69					
Lateral diffusion coefficient (m)		0	0	0	0					
Vertical diffusion coefficient (m)		0	0	0	0					
	0-8 hr		5.3>	.3×10 ⁻³						
χ/Q	8-24 hr		3.1>	.1×10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr	······································	2.0>	×10 ⁻³						
	96-720 hr	· · · ·	8.7>	<10 ⁻⁴						

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 3 of 11)

Table 02 03 04-6-1(3) Combination of Sources and Receptors for Rod Election Accident Analysis in the DCD (Sheet 4 of 11)					
Lable 07 (13 04-6-113) Combination of Sources and Receptors for Roy Election Accident Analysis in the UCU (Sneet 4 of 11)	T 11. 00 00 04 0 4(0)	Campbingtian of Courses and Deep	ntoro for Dod Election	• Accident Analysia is	ALL DOD (Chast 4 st 44)
	Table 02.03.04-6-1(3)	Combination of Sources and Rece	plors for Rou Ejection	i Accident Analysis II	1 the DCD (Sheet 4 of 11)

Acci	dente	Rod Ejection Accident									
			M	CR							
	Locations		Main steam relief valve a	and safety valve releases							
Sourcos	(1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety v						
Sources	Release heights (m)	40.5	38.7	40.5	38.7						
		Intake									
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intak						
Receptors		a of the East	a of the East	a of the West	a of the West						
	Receptor heights (m)	17.1	17.1	17.1	17.1						
Horizonta Source to (m	al distance Receptor	48	41	45	41						
Vertical dis	tance (m) ⁽³⁾	-23	-21	-23	-21						
Straight dis	tance (m) (3)	53	47	51	47						
Direction F Source (d	Receptor to degree) (4)	294	283	64	77						
Lateral coeffici	diffusion ient (m)	0	0	0	0						
Vertical coeffici	diffusion ient (m)	0	0	0	0						
	0-8 hr		5.3	×10 ⁻³							
χ/Q	8-24 hr		3.1	×10 ⁻³							
(s/m ³) ⁽⁶⁾	24-96 hr		2.03	×10 ⁻³							
F	96-720 hr	8.7×10 ⁻⁴									

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able 02.03.04-6-1(3)	Combination of So	urces and Receptors for R	od Ejection Accident A	Analysis in the DCD (Sheet 5 of 11

									1
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				А					
Та	ble 02.03.04-6-1(3)	Combinatio	n of Sources a	nd Receptors	s for Rod Ejec	ction Accide	e DCD (Sheet 5 of 11)		
		Ac	cidents						
				Main stea	m relief valve	and safety v	alve releases		
			Locations ⁽¹⁾	6 of th	e East	7 of	the East		
				(Main steam relief valve)		(Main steam safety valve)			
			Release heights (m) ⁽²⁾	4(40.5 38.7				
				Inleak					
				Class 1E	Class 1E	Class 1E			
			(4)	room	room	room	Class 1E		
		Basantara	Locations ("	HVAC	HVAC	HVAC	HVAC intake ⁽⁷⁾		
		Receptors		intake	intake ⁽⁷⁾	intake		、 、	
				d of the	d of the	d of the	d of the South-	×	
			Pagantar	North-East	South-East	Noπn-East	East		
)			heights (m) ⁽²⁾	16.2	17.1	16.2	17.1		
			Horizontal distance		31	24	26		
		Source to Receptor (m) ⁽³⁾		21	51	24	20		
		Vertical distance (m) ⁽³⁾		-24	-23	-22	-21		
		Straight d	istance (m) (5)	36	39	33	33		
,		Direction Receptor to Source (degree) (4)		299	309	277	291		
		Lateral diffu	ision coefficient (m)	0	0	0	0		
. i —	. Andrea and		al diffusion icient (m)	0	0	0	0		
			0-8 hr		5.3	3×10 ⁻³	L		
		x/Q <u></u> □	8-24 hr		3.1	1×10 ⁻³			
		(s/m ³) ⁽⁶⁾	24-96 hr		2.0)×10 ⁻³			
		96-720 hr		8.7×10 ⁻⁴					

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 6 of 11)

	ccidents			Rod Eject	ion Accident				
	locidents			N	ICR				
Sources	Locations (1)	(Main	Main steam 5 of the Wes steam relief	relief valve st valve)	and safety va 7 (Main s	alve releases of the West	valve)		
	Release heights (m) ⁽²⁾		40.5			38.7			
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	In Reactor building door	leak Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	Reactor building door		
		North- West	South- West	b	North- West	South- West	b		
	Receptor heights (m) (2)	16.2	17.1	9.8	16.2	17.1	9.8		
Horizontal distance Source to Receptor (m) ⁽³⁾		27	31	24	24	26	24		
Vertical	distance (m) (3)	-24	-23	-30	-22	-21	-29		
Straight	distance (m) (3)	36	39	39	33	33	38		
Direction Receptor to Source (degree) ⁽⁴⁾		61	51	88	83	69	101		
Lateral diffusion coefficient (m)		0	0	0	0	0	0		
Vertical diffusion coefficient (m)		· 0 ·	0	- 0	··= ·0 ··	0	0		
	0-8 hr			5.3	×10 ⁻³				
χ/Q	8-24 hr			3.1	×10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr			2.0	×10 ⁻³				
	96-720 hr			8.7	×10				

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 7 of 11)

			Rod Ejection	on Accident		
'	ACCIDENTS		M	CR		
Sources	Locations ⁽¹⁾	Main stear 6 of th (Main stearr	m relief valve a e West r relief valve)	nd safety valve releases 7 of the West (Main steam safety valve)		
	Release heights (m) ⁽²⁾	4().5	38	3.7	
			Inle	eak		
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	
		d of the North-East	d of the South-East	d of the North-East	d of the South-East	
	Receptor heights (m) (2)	16.2	17.1	16.2	17.1	
Horiz Source t	Horizontal distance Source to Receptor (m) ⁽³⁾		48	41	41	
Vertical	distance (m) ⁽³⁾	-24	-23	-22	-21	
Straight	distance (m) ⁽³⁾	51	53	46	47	
Directi Sourc	Direction Receptor to Source (degree) ⁽⁴⁾ Lateral diffusion coefficient (m) Vertical diffusion coefficient (m)		294	274	283	
Lateral di			0	. 0	0	
Vert coe			0	0	_ 0	
	0-8 hr -		- 5.3×	10 ⁻³		
χ/Q	8-24 hr	-	3.1×	:10 ⁻³		
$(s/m^3)^{(6)}$	24-96 hr		2.0×	10 ⁻³		
	96-720 hr		8.7×	:10⁻⁴		

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ĺ					Rod Ejectio	on Accident					
		CCIUEIIIS			M	CR					
		- (1)	Main steam relief valve and safety valve releases								
	_	Locations ("		6 of the East		7 of the East					
	Sources		(Mair	n steam relief v	/alve)	(Main	steam safety	/alve)			
		Release heights (m) ⁽²⁾		40.5			38.7				
					Inle	eak					
	Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door			
			d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b			
		Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8			
	Horizo Source to	Horizontal distance Source to Receptor (m) ⁽³⁾		45	41	41	41	41			
ſ	Vertical	distance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29			
	Straight	distance (m) (3)	49	51	51	46	47	50			
	Direction Receptor to Source (degree) ⁽⁴⁾ Lateral diffusion coefficient (m)		72	64	89	86	77	97			
			0	0	0	0	0	0			
	Verti coe	cal diffusion efficient (m)	0	0	0	0	0	0			
[0-8 hr		ale a la e	5.3×	10 ⁻³ -		· · · · · ·			
	χ/Q	8-24 hr			3.1×	10-3					
	(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	10 ⁻³					
		96-720 hr			8.7×	10 1					

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Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 8 of 11)

			<u> </u>		Rod Ejec	tion Accident	<u> </u>		
AC	cidents					TSC		· · ·	
Sources	Locations ⁽¹⁾	Plan	t vent	Groun contai release 3 of the	d level nment point ⁽⁵⁾ 3 of the	Plant vent		Ground level containment release point ⁽⁵⁾ 3 of the 3 of the	
	Release heights (m) ⁽²⁾	69.8		North South 49.4		69.8		North South 49.4	
			l	ntake			inl	eak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) (2)	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	55	60	44	46	55	60	44	46
Vertical o	distance (m) ⁽³⁾	-43	-43	-22	-22	-43	-43	-22	-22
Straight o	distance (m) ⁽³⁾	69	74	49	51	69	74	49	51
Direction Source	n Receptor to e (degree) ⁽⁴⁾	92	65	98	75	92	65	98	75
Later: coeff	al diffusion ficient (m)	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		· 0 ·	· 0	0	0	0	- <u>0</u>	0	0
	0-8 hr	1.7×	10 ⁻³	1.9×	10 ⁻³	1.7×10 ⁻³		1.9×10 ⁻³	
χ/Q	8-24 hr	9.9×	×10 ⁻⁴	1.1×	10 ⁻³	9.9×10 ⁻⁴		1.1×	10 ⁻³
(s/m ³) ⁽⁶⁾	24-96 hr	6.3×	×10 ⁻⁴	7.2×	10⁴	6.3×10 ⁻⁴		7.2×	:10 ⁻⁴
F	96-720 hr	2.8×	×10 ⁻⁴	3.2×	10 ⁻⁴	2.8×	¢10 ⁻⁴	3.2×10 ⁻⁴	

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 9 of 11)

Table 0	2.03.04-6-1(3) Combination	of Sources and Receptors	for Rod Ejection Accide	ent Analysis in the DCD	Sheet 10 of 11)

A	Accidents –		Rod Ejection Accident TSC							
			Main steam relief valve and safety valve releases							
Sources	Locations ()	6 of the West (Main steam relief valve)		7 of th (Main steam	7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		e West safety valve)	
	Release heights (m) ⁽²⁾	40.5		38.7		40.5		38.7		
			Int	ake			Ini	eak		
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	
·		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizontal to Re	distance Source ceptor (m) ⁽³⁾	69	60	72	61	69	60	72	61	
Vertical	distance (m) (3)	-13	-13	-11	-11	-13	-13	-11	-11	
Straight	distance (m) (3)	70	61	73	62	70	61	73	62	
Direction Receptor to Source (degree) ⁽⁴⁾		121	98	125	103	121	98	125	103	
Lateral dif	fusion coefficient (m)	0	0	0	0	0	0	0	0	
Vertical dif	ffusion coefficient (m)	0	0	0	0	0	0	0	Q	
	0-8 hr		1.4×	×10 ⁻³			1.4>	×10 ⁻³		
χ/Q	8-24 hr		8.0×	×10 ⁻⁴			8.0>	×10 ⁻⁴		
(s/m ³) ⁽⁶⁾ 24-96 hr 96-720 hr			5.1×	×10 ⁻⁴			5.1>	×10 ⁻⁴		
			2.2×	×10 ⁻⁴			2.2>	<10 ⁻⁴		

0	Accidente									
· · · · ·					TS	SC				
	Locations ⁽¹⁾			Main stea	m relief valve a	nd safety valve	e releases			
Sources	Locations	6 of the East (Main steam relief valve)		7 of th (Main steam	e East safety valve)	6 of th (Main steam	ie East i relief valve)	7 of the East (Main steam safety valve)		
	Release heights (m) ⁽²⁾	40).5	38.7		40.5		38.7		
			Inta	ake			Inl	eak		
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizonta to Re	I distance Source eceptor (m) ⁽³⁾	84	76	86	77	84	76	86	77	
Vertical	distance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11	
Straight	distance (m) ⁽³⁾	85	77	87	78	85	77	87	78	
Directio Sourc	on Receptor to ce (degree) ⁽⁴⁾	115	96	119	100	115	96	119	100	
Lateral dif	ffusion coefficient (m)	0	0	0	0	0	0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	0	_ 0	. 0	0	
	0-8 hr		1.4×	:10 ⁻³			1.4>	×10 ⁻³		
χ/Q	8-24 hr		8.0×	:10 ⁻⁴		8.0×10 ⁻⁴				
(s/m ³) ⁽⁶⁾	24-96 hr		5.1×	:10 ⁻⁴		5.1×10 ⁻⁴				

2.2×10⁻⁴

2.2×10⁻⁴

Table 02.03.04-6-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 11 of 11) Rod Ejection Accident

96-720 hr

					caniment analys						
A	ccidents	F	allure of Sma	III Lines Carrying I	-rimary Coolant	Outside Containn	nent				
ļ			MCR								
Sources	Locations ⁽¹⁾			Pl	ant vent						
	Release heights (m) ⁽²⁾		69.8								
		Inta	ake		Inl	eak					
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾				
		a of the East	a of the West	d of the North- East	d of the South-East	d of the North- West	d of the South-West				
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1				
Horizo Source to	ntal distance Receptor (m) ⁽³⁾	68	56	63	68	50	56				
Vertical	distance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52				
Straight	distance (m) ⁽³⁾	86	77	83	86	73	77				
Directio Source	n Receptor to e (degree) ⁽⁴⁾	321	21	317	321	24	21				
Later coef	al diffusion ficient (m)	0	0	0	· 0	0	0				
Vertic coef	Vertical diffusion coefficient (m)		0	0	0	0	0				
	0-8 hr	1.1×	:10 ⁻³		1.2>	<10 ⁻³	2				
x/Q	8-24 hr	6.6×	:10 ⁻⁴		8.0>	×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	:10 ⁻⁴		5.1>	×10 ⁻⁴					
	96-720 hr	1.9×	:10 ^{-₄}		2.2>	×10 ⁻⁴					

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Table 02.03.04-6-1(4) Combination of Sources and Receptors for Failure of Small Lines Carrying Primary Coolant Outside Containment analyses in the DCD(Sheet 1 of 2)

Δ	coidents		Failure of	Small Lines Carry	ving Primary Cool	ant Outside Cont	ainment			
	coluents		MCR			Т	SC			
	Locations ⁽¹⁾		Plant vent		Plant vent					
Sources			9		9					
	Release heights (m) ⁽²⁾		69.8		69.8					
			Inleak		Inta	ake	inle	eak		
Receptors	Locations ⁽¹⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake		
		c of the North	c of the South	b	c of the North	c of the South	c of the North	c of the South		
	Receptor heights (m) ⁽²⁾	27.1	27.1	9.8	27.1	27.1	27.1	27.1		
Horizo Source to	ntal distance Receptor (m) ⁽³⁾	55	60	37	55	60	55	60		
Vertical	distance (m) ⁽³⁾	-43	-43	-60	-43	-43	-43	-43		
Straight	distance (m) ⁽³⁾	69	74	71	69	74	69	74		
Directio Source	n Receptor to e (degree) ⁽⁴⁾	92	65	33	92	65	92	65		
Lateral diff	fusion coefficient (m)	0	0	0	0	0	0	0		
Vertic coef	cal diffusion	0	,_0		0	0	0	0		
	0-8 hr	,	1.4×10 ⁻³	· · · ·	1.4×	×10 ⁻³	1.4×	:10 ⁻³		
χ/Q	8-24 hr		8.0×10 ⁻⁴		8.0×	×10 ⁻⁴	8.0×10 ⁻⁴			
(s/m ³) ⁽⁶⁾	24-96 hr	· · · · · · · · · · · · · · · · · · ·	5.1×10 ⁻⁴		5.1×10 ⁻⁴		5.1×10 ⁻⁴			
	96-720 hr		2.2×10 ⁻⁴		2.2×	×10 ⁻⁴	2.2×	10-⁴		

Table 02.03.04-6-1(4) Combination of Sources and Receptors for Failure of Small Lines Carrying Primary Coolant Outside Containment analyses in the DCD (Sheet 2 of 2)

Acc	idents		SG	TR							
7.00			MC	CR							
	Locations		Main steam relief valve and safety valve releases								
Sources	(1)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)						
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7						
			Inte	ake							
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake						
Receptors		a of the East	a of the East	a of the West	a of the West						
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1						
Horizont Source to (r	al distance o Receptor n) ⁽³⁾	31	26	31	26						
Vertical dis	stance (m) ⁽³⁾	-23	-21	-23	-21						
Straight dis	stance (m) ⁽³⁾	39	33	39	33						
Direction Source	Receptor to (degree) ⁽⁴⁾	309	291	51	69						
Lateral	diffusion cient (m)	0	0	0	0						
Vertical diffusion coefficient (m)		0	0	0	0						
	0-8 hr		5.3×	10 ⁻³							
χ/Q _	8-24 hr		3.1×	10 ⁻³							
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³							
	96-720 hr		8.7×	10 ⁻⁴							

Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 1 of 8)

_

Acc	idents	· · · · ·	SG	TR						
			MC	CR						
	Locations	Main steam relief valve and safety valve releases								
Sources	(1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)					
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7					
			Inta	ake	·,					
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake					
Receptors	;	a of the East	a of the East	a of the West	a of the West					
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1					
Horizont Source t (r	al distance o Receptor n) ⁽³⁾	48	41	45	41					
Vertical di	stance (m) ⁽³⁾	-23	-21	-23	-21					
Straight di	stance (m) ⁽³⁾	53	47	51	47					
Direction Source	Receptor to (degree) ⁽⁴⁾	294	283	64	77					
Lateral coeffic	diffusion cient (m)	0	0	0	0					
Vertica coeffic	l diffusion cient (m)	0	0	0	0					
	0-8 hr		5.3×	10 ⁻³						
χ/Q	8-24 hr		3.1×	10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³						
Γ	96-720 hr		8.7×	10 ⁻⁴						

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Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 2 of 8)

Accie	Accidents		SG	TR		
			M	CR		
Courses	Locations ⁽¹⁾	Main stea 6 of th (Main steam	am relief valve a e East i relief valve)	nd satety valve releases 7 of the East (Main steam safety valve)		
Sources	Release heights (m)	40.5		40.5 38		
			Inle	eak		
	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	
Receptors		d of the North-East	d of the South-East	d of the North-East	d of the South-East	
	Receptor heights (m)	16.2	17.1	16.2	17.1	
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	27	31	24	26	
Vertical dist	ance (m) (3)	-24	-23	-22	-21	
Straight dist	ance (m) ⁽³⁾	36	39	33	33	
Direction Rece (degree	ptor to Source ee) ⁽⁴⁾	299	309	277	291	
Lateral diffusion	coefficient (m)	0	0	0	0	
Vertical diffusior	n coefficient (m)	0	0	0		
	0-8 hr		5.3×	:10 ⁻³		
x/Q	8-24 hr		3.1×	10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	:10 ⁻³		
	96-720 hr		8.7×	·10 ⁻⁴		

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Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 3 of 8)

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Acci	Accidents			SC	STR				
				M	CR				
	Locations ⁽¹⁾		Main stear 6 of the West steam relief v	n relief valve a valve)	and safety valve	nd safety valve releases 7 of the West (Main steam safety valve)			
Sources	Release heights (m)		40.5		38.7				
				Ini	eak				
Decenter	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door		
Receptors		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b		
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8		
Horizontal dista Recept	ance Source to or (m) ⁽³⁾	27	31	24	24	26	24		
Vertical dis	tance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29		
Straight dis	tance (m) ⁽³⁾	36	39	39	33	33	38		
Direction Rece (degr	eptor to Source ee) ⁽⁴⁾	61	51	88	83	69	101		
Lateral diffusion	n coefficient (m)	0	0	. 0	0	0	0		
Vertical diffusion	n coefficient (m)	0	0	0	- 0 -	0	0		
	0-8 hr		•••••••••••••••••••••••••••••••••••••••	5.3	×10 ⁻³				
χ/Q	8-24 hr			3.1	×10 ⁻³	<u> </u>			
(s/m ³) ⁽⁶⁾	24-96 hr			2.0	×10 ⁻³				
	96-720 hr			8.7	×10 ⁻⁴				

Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 4 of 8)

Δ	ccidents		SG	TR		
~			· M(
Sources	Locations ⁽¹⁾	Main stear 6 of th (Main steam	n relief valve a e West relief valve)	nd safety valv 7 of th (Main steam	e releases e West safety valve)	
	Release heights (m) ⁽²⁾	40).5	38.7		
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake d of the North-East	International In	eak Class 1E electrical room HVAC intake d of the North-East	Class 1E electrical room HVAC intake ⁽⁷⁾ d of the South-East	
Horizo	heights (m) ⁽²⁾	44	48	16.2	41	
Source to	$\frac{1}{10000000000000000000000000000000000$		10			
vertical	distance (m)	-24	-23	-22	-21	
Straight	distance (m) (3)	51	53	46	47	
Directic Sourc	on Receptor to e (degree) ⁽⁴⁾	287	294	274	283	
Later coe	ral diffusion fficient (m)	0	0	0	0	
Vertio coe	Vertical diffusion		0	0	0	
	0-8 hr		5.3×	:10 ⁻³		
x/Q	8-24 hr	<u> </u>	3.1×	:10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr	·····	2.0×	:10 ⁻³		
	96-720 hr		8.7×	:10 ⁻⁴		

Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 5 of 8)

Accid	ents			SG	TR	· · · · · · · · · · · · · · · · · · ·					
	1										
	Locations ⁽¹⁾	 (Ma	6 of the East in steam relief va	alve)	7 of the East (Main steam safety valve)						
Sources	Release heights (m)		40.5		38.7						
				Inle	eak						
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door				
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b				
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8				
Horizontal dista Recepto	nce Source to r (m) ⁽³⁾	42	45	41	41	41	41				
Vertical dista	ance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29				
Straight dista	ance (m) ⁽³⁾	49	51	51	46	47	50				
Direction Recep (degre	otor to Source e) ⁽⁴⁾	72	64	89	86	77	97 -				
Lateral diffusion	coefficient (m)	0	0	0	0	0	0				
Vertical diffusion	coefficient (m)	· · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	7 O	·· 0	на в о и на на	0				
	0-8 hr			5.3×	10 ⁻³						
x/Q	8-24 hr			3.1×	×10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr		nt ** y	2.0×	10 ⁻³	18.0 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0 - 19.0					
	96-720 hr			8.7×	·10 ⁻⁴						

Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 6 of 8)

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Accidents		SGTR										
		TSC										
		Main steam relief valve and safety valve releases										
Sources	Locations (1)	6 of the West (Main steam relief valve)		7 of th (Main ste val	7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		e West am safety ve)			
	Release heights (m) ⁽²⁾	40).5	38	3.7	40).5	38	3.7			
	-		Inta	ake			Inle	eak				
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake			
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South			
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1			
Horizontal of to Rec	distance Source eptor (m) ⁽³⁾	69	60	72	61	69	60	72	61			
Vertical c	listance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11			
Straight c	listance (m) ⁽³⁾	70	61	73	62	70	61	73	62			
Directior Source	n Receptor to (degree) ⁽⁴⁾	121	98	125	103	121	98	125	103			
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0			
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0			
	0-8 hr		1.7×	:10 ⁻³			1.7×	:10 ⁻³				
χ/Q	8-24 hr		9.9×	·10 ⁻⁴			9.9×	:10 ⁻⁴				
(s/m ³) (6)	24-96 hr		6.3×	:10 ⁻⁴			6.3×	:10 ⁻⁴				
	96-720 hr		2.8×	10⁴			2.8×	10 ⁻⁴				

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Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 7 of 8)

Accidents		SGTR											
			TSC										
		Main steam relief valve and safety valve releases											
Sources	Locations ⁽¹⁾	6 of the East (Main steam relief valve)		7 of th (Main ste val	7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		e East am safety ve)				
	Release heights (m) ⁽²⁾	4().5	38	3.7	4().5	38	3.7				
			Inta	ake			Inle	eak					
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake				
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South				
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1				
Horizontal to Re	distance Source ceptor (m) ⁽³⁾	84	76	86	77	84	76	86	77				
Vertical	distance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11				
Straight	distance (m) ⁽³⁾	85	77	87	78	85	77	87	78				
Directio Sourc	on Receptor to e (degree) ⁽⁴⁾	115	96	119	100	115	96	119	100				
Lateral dif	Lateral diffusion coefficient (m)		0	0	0	0	0	0	0				
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0				
	0-8 hr		1.7×	<10 ⁻³			1.7×	10 ⁻³					
χ/Q	8-24 hr		9.9×	¢10 ⁻⁴			9.9×	:10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr		6.3×	×10 ⁻⁴			6.3×	:10 ⁻⁴					
	96-720 hr		2.8×	×10 ⁻⁴		2.8×10 ⁻⁴							

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Table 02.03.04-6-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 8 of 8)

Accidents		LOCA										
		MCK										
-	Locations ⁽¹⁾				Plant ven	t						
Sources	Release heights (m) ⁽²⁾	69.8										
		inta	intake Inleak									
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door				
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	b				
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1	9.8				
Horizontal (to Rec	distance Source eptor (m) ⁽³⁾	68	56	63	68	50	56	37				
Vertical o	listance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52	-60				
Straight o	listance (m) (3)	86	77	83	86	73	77	71				
Direction Source	Receptor to (degree) ⁽⁴⁾	321	21	317	321	24	21	33				
Lateral diff	usion coefficient (m)	0	0	0	0	0	0	0				
Vertical diffusion		0	0	0	0	0	0	0				
0-8 hr		1.1×	10 ⁻³			1.4×10 ⁻³						
x/Q	8-24 hr	6.6×	10-4		11 anna	7.7×10 ⁻⁴						
(s/m ³) (6)	24-96 hr	4.2×	10 ⁻⁴			4.9×10 ⁻⁴						
	96-720 hr	1.9×	10-4		· · · · · · · · · · · · · · · · · · ·	2.2×10 ⁻⁴	<u> </u>					

Table 02.03.04-6-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 1 of 3)

•

Ac	Accidents		LOCA									
		MCR										
	Leastions ⁽¹⁾			Ground lev	el containment	release point ⁽⁵⁾						
Sources	Locations	2 of the East	2 of the West] 1 of the East	2 of the East	1 of the West	2 of the West	4				
	Release heights (m)		49.4									
		Int	ake			Inleak						
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door				
		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b				
	Receptor heights (m)	17.1	17.1	16.2	17.1	16.2	17.1	9.8				
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	32	32	27	32	27	32	17				
Vertical of	listance (m) ⁽³⁾	-32	-32	-33	-32	-33	-32	-39				
Straight	listance (m) ⁽³⁾	45	45	42	45	42	45	43				
Direction Source	n Receptor to (degree) ⁽⁴⁾	325	35	320	325	40	35	53				
Later coef	al diffusion icient (m)	7.98	7.98	7.98	7.98	7.98	7.98	7.98				
Vertical diffusion coefficient (m)		5.03	5.03	5.03	5.03	5.03	5.03	5.03				
	0-8 hr	2.2	<10 ⁻³		2.4×10 ⁻³							
χ/Q	8-24 hr	1.3	<10 ⁻³			1.4×10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr	8.3	<10 ⁻⁴			9.1×10 ⁻⁴						
[96-720 hr	3.6	<10 ⁻⁴		4.0×10 ⁻⁴							

Table 02.03.04-6-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 2 of 3)

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Accidents		LOCA										
ACC		TSC										
	Locations ⁽¹⁾		Plan	t vent		Ground level containment release point ⁽⁵⁾						
Sources				9			3 of th	e North				
	Release heights (m)		69	9.8		49.4						
Receptors		Int	ake	inle	eak	Inta	ake	inle	eak			
	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake			
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South			
	Receptor heights (m)	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1			
Horizontal distance Source to Receptor (m) ⁽³⁾		55	60	55	60	44	46	44	46			
Vertical dis	stance (m) ⁽³⁾	-43	-43	-43	-43	-22	-22	-22	-22			
Straight dis	stance (m) ⁽³⁾	69	74	69	74	49	51	49	51			
Direction Source (Receptor to degree) ⁽⁴⁾	92	65	92	65	98	75	98	75			
Lateral diffusion coefficient (m)		0	0	Ō	0	7.98	7.98	7.98	7.98			
Vertical diffusion coefficient (m)		0	0	0	0	5.03	5.03	5.03	5.03			
	0-8 hr	1.4×	1.4×10 ⁻³		×10 ⁻³	1.9×	10 ⁻³	1.9×	10 ⁻³			
χ/Q	8-24 hr	8.0×	8.0×10 ⁻⁴		×10 ⁻⁴	1.1×	:10 ⁻³	1.1×	10 ⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr	5.1×	×10 ⁻⁴	5.1×	×10 ⁻⁴	7.2×	7.2×10 ⁻⁴		7.2×10 ⁻⁴			
	96-720 hr	2.2×	×10 ⁻⁴	2.2×	×10 ⁻⁴	3.2×10 ⁻⁴		3.2×10 ⁻⁴				

Table 02.03.04-6-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 3 of 3)

		Fuel handling accident in the containment										
Acc	lidents	MCR										
-	Locations ⁽¹⁾		Plant vent									
Sources	Deleges					9						
	heights (m) ⁽²⁾		69.8									
	·	Inta	ake				Inleak					
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door		
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b		
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1	27,1	27.1	9.8		
Horizontal d to Rece	istance Source eptor (m) ⁽³⁾	68	56	63	68	50	56	55	60	. 37		
Vertical di	stance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52	-43	-43	-60		
Straight di	stance (m) ⁽³⁾	86	77	83	86	73	77	69	74	71		
Direction Source	Receptor to (degree) (4)	321	21	317	321	24	21	92	65	33		
Lateral diffu	sion coefficient (m)	0	0	0	0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0		
	0-8 hr	1.1×10 ⁻³					1.4×10 ⁻³					
χ/Q	8-24 hr	6.6×	×10 ⁻⁴				8.0×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	:10 ⁻⁴				5.1×10 ⁻⁴					
	96-720 hr	1.9×	:10 ⁻⁴				2.2×10 ⁻⁴					

Table 02.03.04-6-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 1 of 3)

Accidents		Fuel handling accident in the fuel handling area										
		MCR										
_	Locations ⁽¹⁾				F	uel handling	area					
Sources	Delesso	8										
	heights (m) ⁽²⁾		5.8									
Receptors		Inta	ake				Inleak					
	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door		
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b		
	Receptor heights (m) ⁽²⁾	14.3	14.3	14.3	14.3	14.3	14.3	23.2	23.2	7.3		
Horizontal distance Source to Receptor (m) ⁽³⁾		82	105	76	82	100	105	103	114	89		
Vertical	distance (m) ⁽³⁾	8.5	8.5	8.5	8.5	8.5	8.5	17	17	1.5		
Straight	distance (m) ⁽³⁾	83	105	76	83	100	105	105	115	89		
Directio Sourc	n Receptor to e_(degree) ⁽⁴⁾	360	38	360	360	41	38	75	61	47		
Lateral dif	fusion coefficient (m)	0	0	0	0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0		
Ň	0-8 hr	9.9×	:10 ⁻⁴				1.1×10 ⁻³			·		
χ/Q	8-24 hr	5.9×	5.9×10 ⁻⁴				6.7×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr	3.7×	:10-4				4.3×10 ⁻⁴					
	96-720 hr	1.6×	:10⁻⁴				1.9×10 ⁻⁴					

Table 02.03.04-6-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 2 of 3)

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	Accidente		Fuel handling accident in the containment Fuel handling accident in the fuel handling area									
AU		TSC										
	Locations ⁽¹⁾		Plant	vent			Fuel handling area					
Sources			<u> </u>)			8					
	Release heights (m) ⁽²⁾		69	.8			5.	8				
		Inta	ake	inle	eak	Inta	ake	inleak				
Receptors	Locations ⁽¹⁾ Receptors	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake			
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South			
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	23.2	23.2	23.2	23.2			
Horizontal distance Source to Receptor (m) ⁽³⁾		55	60	55	60	103	114	103	114			
Vertical d	listance (m) ⁽³⁾	-43	-43	-43	-43	17	17	17	17 /			
Straight o	listance (m) ⁽³⁾	69	74	69	74	105	115	105	115			
Directior Source	Receptor to (degree) ⁽⁴⁾	92	65	92	65	75	61	75	61			
Lateral diffu	usion coefficient (m)	0	0	0	0	0	0	0	0			
Vertical diff	usion coefficient (m)	0	0	0	0	0	0	0	0			
	0-8 hr	1.4×	10 ⁻³	1.4×	10 ⁻³	6.7×	×10 ⁻⁴	6.7×	±10 ⁻⁴			
x/Q	8-24 hr	8.0×	:10 ⁻⁴	8.0×	10⁴	3.9×	×10 ⁻⁴	3.9×	:10 ⁻⁴			
(s/m ³) ⁽⁶⁾	24-96 hr	5.1×	:10 ⁻⁴	5.1×	10⁻⁴	2.5×	:10⁻⁴	2.5×	÷10 ⁻⁴			
	96-720 hr	2.2×	:10 ⁻⁴	2.2×	10-4	1.1×	1.1×10 ⁻⁴		1.1×10 ⁻⁴			
	<u>, , , , , , , , , , , , , , , , , , , </u>			<u> </u>	A		· · ·		· · · · · ·			

Table 02.03.04-6-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 3 of 3)

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NOTES:

- (1) The inside of a parenthesis shows the source locations and receptor locations of the Figure 02.03.04-6-1
- (2) The height is from the ground level. The ground level is E.L.= 2' -8"
- (3) These values are the distance differences in a unit of meter from the source to the receptor. After the distance differences are calculated from the locations of the source and the receptor in a unit of feet, the resulted distance differences are rounded off. Those rounded numbers of the distance differences are converted to those in a unit of meter. Therefore, note that these values are a bit different from the difference between the source height and receptor height in a unit of meter indicated in the above (2), because the source height and receptor height in a unit of feet, without any calculation in a unit of feet.
- (4) The angle of receptors from Plant North centering on sources (Direction increases in a clockwise fashion based on the Plant North, i.e. The Plant North is 0 degree.)
- (5) Area source, which is determined from the method in Sections C.3.2.4.4 and C.3.2.4.5 of RG 1.194.
- (6) These χ/Q values are for US-APWR DCD Chapter15.
 - The χ/Q values of MCR can't be directly calculated by ARCON96 itself because there is no site specific meteorological data in the stage of the DCD. Therefore, the diffusion equations described in ARCON96 (e.g. Revision 1 to NUREG-6331) are used for calculating the χ/Q values of MCR, together with the meteorological condition based on RG 1.194 (e.g., F stability with wind speeds of 1.0 m/s) and multiplier. According to the setting method of these χ/Q values, the closer the distance the more conservative it becomes. It is not used the ARCON96 directly in DCD.
- For each sources, the χ/Q values for inleakage and intake are set as those of the path with the shortest straight distances, respectively.
- (7) Class 1E electrical room HVAC intake (south east) and MCR HVAC Intake (east) are same intake duct (i.e. they are same location).

(8) Class 1E electrical room HVAC intake (south - west) and MCR HVAC Intake (west) are same intake duct (i.e. they are same location).

○ SOURCES

- 1. Containment Shell to Class 1E electrical room HVAC intake (As Diffuse Area Source)
- 2. Containment Shell to Control Room HVAC Intake and Class 1E electrical room HVAC intake (As Diffuse Area Source)

POWER

SOURCE

- 3. Containment Shell to Auxiliary Building HVAC Intake and technical support center HVAC Intake (As Diffuse Area Source)
- 4. Containment Shell to Reactor Building Door (As Diffuse Area Source)
- 5. Main Steam Line (Source points are in the west and the east.)
- 6. Relief Valve (Source points are in the west and the east.)
- 7. Safety Valve (Source points are in the west and the east.)
- 8. Fuel Handling Area
- 9. Plant Vent

∧ <u>RECEPTORS</u>

- a. Main Control Room HVAC Intake
- b. Reactor Building Door
- c. Auxiliary Building HVAC Intake and Technical Support Center HVAC Intake d. Class 1E electrical room HVAC intake
 - BUILDING $\overline{\bigcirc 8}$ ΔM d a,d 26 7 5 FUEL \bigcirc \bigcirc Ο HANDLING TURBINE CONTAINMENT AREA BUILDING 6 7 5 9 \bigcirc \bigcirc \bigcirc \bigcirc 2 3 3 b d a,d POWER AUXILIARY BUILDING SOURCE BUILDING ∇^{c} \bigvee ACCESS Figure 02.03.04-6-1 Site Plan with BUILDING Release and Intake Locations

Impact on DCD

DCD should be revised as described in "Impact on DCD" of Open Item 02.03.04-1.

Impact on COLA

Table of "Key Site Parameter" and Figure of "Site Plan with Release and Intake Locations" in FSAR Chapter 2 will be revised.

Impact on PRA

There is no impact on the PRA.

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DRAFT OPEN ITEMS RSAC 2.3.4

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

SRP SECTION:	02.03.04 - Shor Accident Relea	t Term Atmospheric Dispersion Estimates for ses
APPLICATION SECTION:	DCD Tier 2, Sec	ction 2.3.4
DATE OF DRAFT OPEN ITEM	S ISSUE:	2/13/2009

[Open Item 02.03.04-7] This question is related to the applicant's response to RAI 02.03.04-4.

The response to RAI 02.03.04-4 incorrectly states that F stability with a wind speed of 1.0 m/s is a conservative meteorological condition for the ARCON96 atmospheric dispersion model and should be corrected accordingly.

The response to RAI 02.03.04-4 proposes a revision to DCD Tier 2 Section 2.3.4 which states, in part, that the main control room (MCR) 0-8 hr key site parameter χ/Q values were calculated based on the diffusion equations used in the ARCON96 atmospheric dispersion model (Revision 1 to NUREG-6331 [sic]) and conservative meteorological conditions (e.g., F stability and 1.0 m/s wind speed). F stability with a wind speed of 1.0 m/s is a conservative (e.g., 95-percentile) meteorological condition for the Murphy-Camped model discussed in Section C.4 of RG 1.194 but is not a conservative meteorological condition for the ARCON96 atmospheric dispersion model. Although ARCON96 uses a simple Gaussian dispersion model, the concentrations predicted by ARCON96 do not vary inversely with wind speed for all wind speeds because the building wake correction algorithm is not a linear function of wind speed. A plot of ARCON96 χ/Q values as a function of wind speed and stability class, as presented in Figure 1, shows conservative χ/Q values are associated with wind speeds of 3 to 4 m/s.

ANSWER:

This question is the same as Open Item 02.03.04-4.

The meteorological condition of F stability with 1 m/s is not conservative for the ARCON96 dispersion model as you mention. However we did not use the ARCON96 directly in DCD for X/Q calculation, we used the formula based on ARCON96 with multiplier with conservatism. In the present analyses the dispersion associated with F stability with 1 m/s is multiplied by a factor of 2. By modifying the X/Q model in this way the dispersion results envelop most existing plant x/Q values in US. Therefore we believe our modification to the ARCON96 model yields sufficiently conservative results. That is we did not use ARCON96 directly in DCD.

Impact on DCD

The expression "the conservative meteorological condition referred to RG 1.194" described in "Impact on DCD" of RAI 02.03.04-4 should be changed to "the meteorological condition referred to RG 1.194" for the revised DCD.

The sentence "It is not used the ARCON96 in DCD" should be added in the foot notes of Table 2.3-2 of answer of and answer of RAI 02.03.04-4 for revised DCD.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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Docket No. 52-021 MHI Ref: UAP-HF- 09284

Enclosure 2

UAP-HF-09284 Docket No. 52-021

Responses Revision 1 to Request for Additional Information No. 42-772, Revision 0

June, 2009

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:NO.42-772 REVISION 0SRP SECTION:02.03.04 - Short Term Atmospheric Dispersion Estimates for
Accident ReleasesAPPLICATION SECTION:DCD Tier 2 Appendix 15ADATE OF RAI ISSUE:7/30/2008

QUESTION NO. : 02.03.04-1

Revise DCD Tier 2 Figure 15A-1 to (1) indicate plant north and (2) add the technical support center (TSC) intake and inleakage locations.

The applicant stated in DCD Tier 2 Section 15.6.5.5.1.3 that the dose calculation model used to evaluate main control room (MCR) habitability for the loss-of-coolant accident (including source term, transport, and release assumptions) were also used to evaluate the TSC habitability for the same event. The applicant also stated that the distances from release points to receptors are almost the same between the TSC and MCR; therefore, the radiological consequences in the TSC are represented by those in the MCR. DCD Tier 2 Figure 15A-1 is a site plan showing release locations and MCR receptors. The TSC intake and inleakage locations should be added to Figure 15A-1 to confirm the applicant's statement that the distances from release points to receptors to receptors are almost the same between the TSC and MCR.

ANSWER:

Figure 02.03.04-1 is a site plan showing release locations and, MCR and TSC receptors for the US-APWR. MHI will revise DCD Tier 2 Figure 15A-1 to (1) indicate plant north and (2) add the TSC intake and inleakage locations.

The TSC is located inside the access building. The TSC heating, ventilation, and air conditioning (HVAC) intake and the auxiliary building (A/B) HVAC intake are located on the roof of the A/B. The air enters from same louver to these intakes. The TSC inleakage location for all the DBAs, except for the failure of small lines carrying primary coolant outside of the containment, is assumed to be equal to the TSC HVAC intake and inleakage location.

In the failure of small lines carrying primary coolant outside of the containment, the radioactivity in spilled reactor coolant is postulated to be discharged to the atmosphere from the plant vent, and be transferred to the TSC via the TSC HVAC system.

The MCR and TSC intake and inleakage locations are provided in Table 02.03.04-1(1) through Table 02.03.04-1(7).

The distances from sources to receptors for TSC are generally equivalent to or longer than the distances for MCR, except for plant vent pathway of the loss-of-coolant accident (LOCA), the rod ejection accident, the failure of small lines carrying primary coolant outside containment and the fuel handling accident in the in the containment.

In the LOCA and the rod ejection accident, though the distances from plant vent to receptors for the TSC are shorter than those distances for the MCR, the distances from other sources for TSC are longer than those distances for MCR. As the result the TSC dose is less than the MCR dose. In addition, though the TSC dose due to the failure of small lines and the fuel handling accident in the containment are larger than the MCR dose in those events, the TSC dose due to these accidents are bounded by the MCR dose during the LOCA. Therefore the radiological consequences in the TSC are bounded by those in the MCR.

The following tables added on Table 02.03.04-1(1) through Table 02.03.04-1(7) from Table 02.03.04-1(1) through Table 02.03.04-1(6) of RAI 02.03.04-1 Revision 0.are as follows.

- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 2 of 12)
- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 4 of 12)
- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 7 of 12)
- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 8 of 12)
- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 10 of 12)
- Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 12 of 12)
- Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 2 of 8)
- Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 5 of 8)
- Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 6 of 8)
- Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 8 of 8)
- Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 4 of 11)
- Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 7 of 11)
- Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 8 of 11)
- Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 11 of 11)
- Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 2 of 8)
- Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 5 of 8)
- Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 6 of 8)
- Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 8 of 8)
| Acci | Accidents | | Steam system piping failure | | | | | | |
|------------------------------------|---|-----------------------|-----------------------------|---|--|---|--|-----------------------------|--|
| | | | | | MCR | | | . <u> </u> | |
| | | | | Main | steam line breal | k releases | | | |
| Sourcos | Locations " | 5 of the
East | 5 of the
West | 5 of th | e East | 5 of the West | | | |
| Sources | Release
heights (m) | 12.8 | 26.2 | 12 | 2.8 | 26.2 | | | |
| | | Int | ake | | | Inleak | | | |
| | Locations ⁽¹⁾ | MCR
HVAC
intake | MCR
HVAC
intake | Class 1E
electrical
room HVAC
intake | Class 1E
electrical
room HVAC
intake ⁽⁷⁾ | Class 1E
electrical
room HVAC
intake | Class 1E
electrical
room HVAC
intake ⁽⁸⁾ | Reactor
building
door | |
| Receptors | | a of the
East | a of the
West | d of the
North-East | d of the
South-East | d of the
North-West | d of the
South-West | b | |
| | Receptor
heights (m) | 14.3 | 17.1 | 14.3 | 14.3 | 16.2 | 17.1 | 9.8 | |
| Horizonta
Source to R | al distance
eceptor (m) ⁽³⁾ | 17 | 25 | 20 | 17 | 26 | 25 | 33 | |
| Vertical dis | stance (m) ⁽³⁾ | 0 | -8.8 | 0 | 0 | -9.8 | -8.8 | -16 | |
| Straight dis | stance (m) (3) | 17 | 26 | 20 | 17 | 28 | 26 | 37 | |
| Direction I
Source (| Receptor to degree) ⁽⁴⁾ | 256 | 93 | 234 | 256 | 110 | 93 | 132 | |
| Lateral
coeffic | diffusion
ient (m) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Vertical
coeffic | diffusion
ient (m) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| | 0-8 hr | 1.9> | ·10 ⁻² | | | 1.9×10 ⁻² | | | |
| x/Q | 8-24 hr | 1.1> | <10 ⁻² | | | 1.1×10 ⁻² | | | |
| (s/m ³) ⁽⁶⁾ | 24-96 hr | 7.1> | ×10 ⁻³ | | he e e | 7.1×10 ⁻³ | * | | |
| | 96-720 hr | 3.1> | ×10 ⁻³ | | | 3.1×10 ⁻³ | | | |

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Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 1 of 12)

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Acci	Accidents	Steam system piping failure							
					MCR				
	(1)			Main	steam line breal	k releases			
Sources	Locations ''	5 of the West	5 of the East	5 of the	e West	5 of the East			
Ources	Release heights (m)	26.2	12.8	26	5.2	12.8			
		Int	ake			Inleak		·*	
Basantara	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	
Receptors		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	room HVAC intake ⁽⁸⁾ d of the South-West 14.3 9.8 49 55		
	Receptor heights (m)	17.1	14.3	16.2	17.1	14.3	14.3	9.8	
Horizonta Source to R	al distance eceptor (m) ⁽³⁾	40	49	41	40	50	49	55	
Vertical dis	tance (m) ⁽³⁾	-8.8	0	-9.8	-8.8	0	0	-2.7	
Straight dis	stance (m) ⁽³⁾	41	49	42	41	50	49	55	
Direction I Source (Receptor to degree) (4)	269	95	258	269	104	95	118	
Lateral coeffic	diffusion ient (m)	0	0	0	0	0	0	0	
Vertical coeffic	diffusion ient (m)	0	0	0	0	0	0	0	
·	0-8 hr	1.9×	10 ⁻²		·	1.9×10 ⁻²	•		
χ/Q	8-24 hr	1.1×	:10 ⁻²			1.1×10 ⁻²			
(s/m ³) ⁽⁶⁾	24-96 hr	7.1×	:10 ⁻³			7.1×10 ⁻³			
	96-720 hr	3.1×	10 ⁻³			3.1×10 ⁻³			

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 2 of 12)

Δα	cidents	Steam system piping failure							
		MCR							
		Main steam relief valve and safety valve releases							
Sources	Locations ⁽¹⁾	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)				
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7				
			Ir	ntake					
Decembers	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake				
Receptors		a of the East a of the East a of the West		a of the West					
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1				
Horizontal to Rec	distance Source ceptor (m) ⁽³⁾	31	26	31	26				
Vertical of	distance (m) ⁽³⁾	-23	-21	-23	-21				
Straight of	distance (m) ⁽³⁾	39	33	39	33				
Direction Re (de	eceptor to Source egree) ⁽⁴⁾	309	291	51	69				
Lateral diff	usion coefficient (m)	0	0	0	0				
Vertical diff	usion coefficient (m)	0	0	0	0				
	0-8 hr		5.3	3×10 ⁻³					
x/Q	8-24 hr		3.1	1×10 ⁻³					
(s/m ³) ⁽⁶⁾	24-96 hr		2.0	0×10 ⁻³					
	96-720 hr		8.7	7×10 ⁻⁴					

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 3 of 12)

Accidents		Steam system piping failure						
A	couents	MCR						
Sources	Locations ⁽¹⁾	Main 6 of the West (Main steam relief valve)	steam relief valve 7 of the West (Main steam safety valve)	and safety valve 6 of the East (Main steam relief valve)	releases 7 of the East (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7			
	· · · · · ·		lr	ntake				
Decentors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake			
Receptors		a of the East a of the East a of the West		a of the West				
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal to Red	distance Source ceptor (m) ⁽³⁾	48	41	45	41			
Vertical	distance (m) ⁽³⁾	-23	-21	-23	-21			
Straight	distance (m) ⁽³⁾	53	47	51	47			
Direction Re	eceptor to Source egree) (4)	294	283	64	77			
Lateral diff	usion coefficient (m)	0	0	0	0			
Vertical diff	fusion coefficient (m)	0	0	0	0			
	0-8 hr		5.3	3×10 ⁻³	217 - Marine I.			
χ/Q	8-24 hr		3.1	1×10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr		2.0	0×10 ⁻³				
	96-720 hr		8.7	7×10 ⁻⁴				

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 4 of 12)

Acc	idents	Steam system piping failure					
,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		MCR					
Courses	Locations ⁽¹⁾	Main stea 6 of th	e East	nd safety valve releases 7 of the East			
Sources		(Iviain steam	relier valve)	(Main steam	safety valve)		
	(m) ⁽²⁾	Steam system piping failure MCRMain steam relief valve and safety valve releas 6 of the East (Main steam relief valve)7 of the East 7 of the East (Main steam safety)40.538.7InleakClass 1E electrical 			3.7		
			Inle	eak			
Receptors	. Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾		
		d of the North-East	d of the South-East	d of the North-East	d of the South-East		
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1		
Horizontal dis Recep	tance Source to tor (m) ⁽³⁾	27	31	24	26		
Vertical dis	stance (m) ⁽³⁾	24	-23	-22	-21		
Straight di	stance (m) ⁽³⁾	36	39	33	33		
Direction Rec (deg	eptor to Source ree) ⁽⁴⁾	299	309	277	291		
Lateral diffusion	on coefficient (m)	0	0	0	0		
Vertical diffusion	on coefficient (m)	0	0	0	0		
	0-8 hr		5.3×	10 ⁻³			
X/Q	8-24 hr		3.1×	10 ⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³			
	96-720 hr		8.7×	10-4			

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 5 of 12)

	Accidents		Steam system piping failure						
		MCR							
Sources	Locations ⁽¹⁾	Main Main	ain steam ro of the Wes steam relief	elief valve a st ^r valve)	nd safety valve releases 7 of the West (Main steam safety valve)				
	Release heights (m) ⁽²⁾	40.5				38.7			
			_	Inle	eak				
Receptors	Locations ⁽¹⁾	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door		
		d of the North- West	d of the South- West	b	d of the North- West	d of the South- West	b		
	Receptor heights (m) (2)	16.2	17.1	9.8	16.2	17.1	9.8		
Horizontal dis Recer	stance Source to otor (m) ⁽³⁾	27	31	24	24	26	24		
Vertical di	stance (m) (3)	-24	-23	-30	-22	-21	-29		
Straight d	stance (m) ⁽³⁾	36	39	39	33	33	38		
Direction Red	ceptor to Source gree) (4)	61	51	88	83	69	101		
Lateral diffusion	on coefficient (m)	0	0	0	0	0	0		
Vertical diffusi	on coefficient (m)	0	0	0	0	0	0		
	0-8 hr	<u> </u>	•	5.3	<10 ⁻³	•	•		
χ/Q	8-24 hr		_	3.1>	<10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr			2.0>	<10 ⁻³				
	96-720 hr	<u> </u>		8.7>	<10 ⁻⁴				

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 6 of 12)

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Accid	lents	Steam system piping failure					
		MCR					
Sources	Locations ⁽¹⁾	Main stea 6 of the Main steam)	m relief valve a e West relief valve)	nd safety valve releases 7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40).5	38	8.7		
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾		
ľ		d of the North-East	d of the South-East	d of the North-East	d of the South-East		
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1		
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	44	48	41	41		
Vertical dist	ance (m) (3)	-24	-23	-22	-21		
Straight dist	ance (m) (3)	51	53	46	47		
Direction Rece (degree	ptor to Source ee) ⁽⁴⁾	287	294	274	283		
Lateral diffusion	coefficient (m)	0	0	0	0		
Vertical diffusior	n coefficient (m)	0	0	0	0		
	0-8 hr		5.3>	×10 ⁻³			
χ/Q	8-24 hr		3.1×	×10 ⁻³	,		
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	×10 ⁻³			
	96-720 hr		8.7>	•10 ⁻⁴			

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 7 of 12)

Accidents		Steam system piping failure							
		MCR							
Sources	Locations ⁽¹⁾	Main ((Main)	Main steam relief valve and sai 6 of the East (Main steam relief valve) (M				3afety valve releases 7 of the East (Main steam safety valve)		
	Release heights (m) ⁽²⁾		40.5			38.7			
				Inle	eak				
Receptors	Locations ⁽¹⁾	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrica I room HVAC intake	Class 1E electrica I room HVAC intake ⁽⁸⁾	Reactor building door		
		d of the North- West	d of the South- West	b	d of the North- West	d of the South- West	b		
	Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8		
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	42	45	41	41	41	41		
Vertical dist	ance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29		
Straight dist	ance (m) ⁽³⁾	49	51	51	46	47	50		
Direction Rece (degree	ptor to Source ee) ⁽⁴⁾	72	64	89	86	77	97		
Lateral diffusion	coefficient (m)	0	0	0	0	0	0		
Vertical diffusior	n coefficient (m)	0	0	0	0	0	0		
	0-8 hr			5.3×	10 ⁻³		·		
χ/Q	8-24 hr			3.1×	:10 ⁻³	10-10-5 <u>-</u> 24			
(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	:10 ⁻³				
	96-720 hr			8.7×	10-4				

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 8 of 12)

Accidents		Steam system piping failure						
		TSC						
Sources	Locations (1)	Main steam line break releases 5 of the West						
Sources	Release heights (m) ⁽²⁾		26	5.2				
		Inta	ake	Inle	eak			
Recentors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake			
Receptors		c of the North	c of the South	c of the North	c of the South			
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1			
Horizontal distance to Intake (m) ⁽³⁾		84	67	84	67			
Vertical	distance (m) ⁽³⁾	0	0	0	0			
Straight	distance (m) ⁽³⁾	84	67	84	67			
Direction Re	eceptor to Source egree) (4)	135	118	135	118			
Later coet	al diffusion ficient (m)	0	0	0	0			
Vertic coef	cal diffusion ficient (m)	0	0	0	0 ·			
· ··· ·	0-8 hr	1.5×	:10 ⁻³	1.5×	·10 ⁻³			
χ/Q	8-24 hr	8.4×	×10 ⁻⁴	8.4×	·10 ⁻⁴			
(s/m ³) ⁽⁶⁾	24-96 hr	5.3×	×10 ⁻⁴	5.3×10 ⁻⁴				
	96-720 hr	2.3×	:10 ⁻⁴	2.3×	2.3×10 ⁻⁴			

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 9 of 12)

Table 02.03.04-1(1) Combination of Sou	urces and <u>Receptors for Steam System Piping</u> Failure Analysis in the DCD (Shee	t 10 of 12)

Accidents		Steam system piping failure						
	ceidents	TSC						
Courses	Locations (1)	Main steam line break releases 5 of the East						
Sources	Release heights (m) ⁽²⁾		12	2.8	2.8			
		Inta	ake	Inle	eak			
Recentors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC TSC HVAC intake intake		Auxiliary building HVAC intake			
Neceptors		c of the North	c of the South	ystern piping failureTSCInleak12.8Inleak12.8InleakACAuxiliary building HVAC intakeAuxilia building I intake20C of the North 23.2C of the S23.223.21049110101059112711300001.5×10 ⁻³ 8.4×10 ⁻⁴ 2.3×10 ⁻⁴	c of the South			
	Receptor heights (m) ⁽²⁾	23.2	23.2	23.2	23.2			
Horizon Inta	tal distance to ake (m) ⁽³⁾	104	91	104	91			
Vertical	distance (m) ⁽³⁾	10	10	10	10			
Straight	distance (m) ⁽³⁾	105	91	105	91			
Direction Ro (de	eceptor to Source egree) ⁽⁴⁾	127	113	127	113			
Later coef	ral diffusion fficient (m)	0	0	0	0			
Vertic coef	cal diffusion fficient (m)	0	0	0 0				
	0-8 hr	1.5×	:10 ⁻³	1.5×	·10 ⁻³			
χ/Q	8-24 hr	$ \begin{array}{c c c c c c c c c } TSC HVAC intake & TSC HVAC intake & Auxiliary building HVA intake & c of the North & c of the South & c of the North & c of the South & c of the North & c of the South & c of the North & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & $		8.4×	×10 ⁻⁴			
(s/m ³) ⁽⁶⁾	24-96 hr	5.3×	:10 ⁻⁴	5.3×10 ⁻⁴				
	96-720 hr	2.3×	÷10 ⁻⁴	2.3×10 ⁻⁴				

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Accidents		Steam system piping failure								
					T\$	SC				
Sources	Locations (1)	6 of th (Main steam	e West relief valve)	Main stean 7 of th (Main ste val	Main steam relief valve an 7 of the West (Main steam safety valve)		nd safety valve_releases 6 of the West (Main steam relief valve)		7 of the West (Main steam safety	
	Release heights (m) ⁽²⁾	40).5	38	38.7).5	38	3.7	
			Inta	ake		Inleak				
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizontal d to Rece	listance Source eptor (m) ⁽³⁾	69	60	72	61	69	60	72	61	
Vertical di	istance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11	
Straight di	istance (m) ⁽³⁾	70	61	73	62	70	61	73	62	
Direction Source	Receptor to (degree) (4)	121	98	125	103	121	98	125	103	
Lateral diffu	sion coefficient (m)	0	0	0	0	0	0	0	0	
Vertica coeffi	l diffusion cient (m)	0	0	0	0	0	0	0	0	
	0-8 hr		1.7×	10 ⁻³			1.7×10 ⁻³			
X/Q	8-24 hr		9.9×	×10 ⁻⁴	9.9×10 ⁻⁴					
$(s/m^3)^{(6)}$	24-96 hr		6.3×	×10 ⁻⁴			6.3×	10 ⁻⁴		
	96-720 hr		2.8×	×10 ⁻⁴			2.8×	10 ⁻⁴		

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 11 of 12)

Acc	ridents				Steam system	n piping failure			
					TS	SC			
Sources	Locations (1)	6 of th (Main steam	e East relief valve)	Main stean 7 of th (Main ste val	Main steam relief valve a 7 of the East (Main steam safety valve)		e releases e East relief valve)	7 of the East (Main steam safety valve)	
	Release heights (m) ⁽²⁾	40).5	38.7		40	0.5	38	8.7
			Inta	ake			Inle	ak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizontal d to Rece	istance Source eptor (m) ⁽³⁾	84	76	86	77	84	76	86	77
Vertical di	stance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11
Straight di	stance (m) ⁽³⁾	85	77	87	78	85	77	87	78
Direction Source	Receptor to (degree) (4)	115	96	119	100	115	96	119	100
Lateral diffu	sion coefficient (m)	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
	0-8 hr		1.7×	:10 ⁻³			1.7×	10 ⁻³	
χ/Q	8-24 hr		9.9×	10-4			9.9×	10 ⁻⁴	
(s/m ³) ⁽⁶⁾	24-96 hr		6.3×	10-4			6.3×	10-4	
	96-720 hr		2.8×	10 ⁻⁴			2.8×	10⁴	

Table 02.03.04-1(1) Combination of Sources and Receptors for Steam System Piping Failure Analysis in the DCD (Sheet 12 of 12)

Accidents			RCP rotor sei	zure accident	
AU			M	CR	
		Main st	eam relief valve a	nd safety valve re	eleases
	Locations ⁽¹⁾	6 of the East	7 of the East	6 of the West	7 of the West
Sources		(Main steam	(Main steam	(Main steam	(Main steam
	Poloaso	relier valve)	safety valve)		sarety valve)
	heights (m) ⁽²⁾	40.5	38.7	40.5	38.7
			Inta	ake	,
Receptors	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1
Horizontal to Rec	distance Source eptor (m) ⁽³⁾	31	26	31	26
Vertical of	listance (m) ⁽³⁾	-23	-21	-23	-21
Straight of	distance (m) ⁽³⁾	39	33	39	33
Direction Source	n Receptor to e (degree) ⁽⁴⁾	309	291	51	69
Lateral diff	usion coefficient (m)	0	0	0	0
Vertic coef	al diffusion ficient (m)	0	0	0	0
	0-8 hr		5.3>	×10 ⁻³	
_{x/Q} ∣	8-24 hr		3.1>	×10 ⁻³	
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	·10 ⁻³	
	96-720 hr		8.7	×10 ⁻⁴	·

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 1 of 8)

·	cidents		RCP rotor se	izure accident	
			M	CR	
		Main st	eam relief valve a	nd safety valve re	eleases
Sources	Locations ⁽¹⁾	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)
	Release heights (m) ⁽²⁾	40.5	40.5	38.7	
			Inta	ake	
Recontors	Locations (1)	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake
Receptors		a of the East	a of the East	a of the West	a of the West
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1
Horizontal to Red	distance Source ceptor (m) ⁽³⁾	48	41	45	41
Vertical	distance (m) ⁽³⁾	-23	-21	-23	-21
Straight	distance (m) ⁽³⁾	53	47	51	47
Directio Source	n Receptor to e (degree) ⁽⁴⁾	294	283	64	77
Lateral diff	usion coefficient (m)	0	. 0	0	0
Vertic coef	al diffusion ficient (m)	0	0	0	0
	0-8 hr		5.3×	×10 ⁻³	
χ/Q	8-24 hr		3.1×	:10 ⁻³	
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	:10 ⁻³	
	96-720 hr		8.7×	:10 ⁻⁴	

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Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 2 of 8)

Accidents			RCP rotor se	izure accident		
			M	CR		
	Locations ⁽¹⁾	Main stea 6 of th	m relief valve a e East	nd safety valve releases 7 of the East		
Sources		(Main steam	relief valve)	(Main steam	safety valve)	
Courses	Release heights (m)	40.5		38.7		
			Inte	eak		
Pecentors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	
Receptors		d of the North-East	d of the South-East	d of the North-East	d of the South-East	
	Receptor heights (m)	16.2	17.1	16.2	17.1	
Horizontal dis to Recep	stance Source otor (m) ⁽³⁾	27	31 ⁻	. 24	26	
Vertical dis	tance (m) ⁽³⁾	-24	-23	-22	-21	
Straight dis	tance (m) ⁽³⁾	36	39	33	33	
Direction F Source (Receptor to degree) ⁽⁴⁾	299	309	277	291	
Lateral diffus (r	ion coefficient n)	0	0	0	0	
Vertical diffus (r	ion coefficient n)	0	0	0	0	
	0-8 hr		5.3×	10 ⁻³		
χ/Q	8-24 hr		3.1×	:10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³		
l	96-720 hr		8.7×	:10⁴		

 Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 3 of 8)

	donto	[RCP rotor se	zure accident			
				M	CR			
	Locations ⁽¹⁾		Main stea 6 of the West n steam relief v	am relief valve a alve)	nd safety valve releases 7 of the West (Main steam safety valve)			
Sources	Release heights (m)		40.5			38.7		
				Inle	eak			
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b	
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8	
Horizontal dis to Recep	stance Source otor (m) ⁽³⁾	27	31	24	24	26	24	
Vertical dis	tance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29	
Straight dis	tance (m) ⁽³⁾	36	39	39	33	33	38	
Direction F Source (Receptor to degree) ⁽⁴⁾	61	51	88	83	69	101	
Lateral diffus (r	ion coefficient n)	0.	0	0	0	0	0	
Vertical diffus (r	ion coefficient m)	0	0	0	0	0	0	
	0-8 hr			5.3×	10 ⁻³			
χ/Q	8-24 hr			3.1×	10 ⁻³			
(s/m³) ⁽⁶⁾	24-96 hr			2.0×	10 ⁻³		1. 27 - 28 al	
	96-720 hr			8.7×	10 ⁻⁴ ·			

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 4 of 8)

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Acci	dents		RCP rotor se	izure accident						
Accidents			MCR							
0	Locations ⁽¹⁾	Main stea 6 of th (Main steam	m relief valve a e West i relief valve)	nd safety valve 7 of th (Main steam	e releases e West safety valve)					
Sources	Release heights (m)	40).5	38.7						
			Inle	eak	· · · · ·					
Recentors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾					
Receptors		d of the North-East	d of the South-East	d of the North-East	d of the South-East					
	Receptor heights (m)	16.2	17.1	16.2	17.1					
Horizontal dis to Recep	stance Source otor (m) ⁽³⁾	44	48	41	41					
Vertical dis	tance (m) ⁽³⁾	-24	-23	-22	-21					
Straight dis	tance (m) ⁽³⁾	51	53	46	47					
Direction F Source (d	Receptor to degree) ⁽⁴⁾	287	294	274	283					
Lateral diffusi (r	ion coefficient n)	0	0	0	0					
Vertical diffus (r	Vertical diffusion coefficient (m)		0	0	0					
	0-8 hr		5.3×	:10 ⁻³						
χ/Q	8-24 hr		3.1×	:10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	10 ⁻³						
	96-720 hr		8.7×	10 ⁻⁴						

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 5 of 8)

	donto			RCP rotor set	zure accident			
	uents			M	CR			
	Locations (1)		Main stea 6 of the East n steam relief v	am relief valve a alve)	nd safety valve releases 7 of the East (Main stoom sofety valve)			
Sources	Release heights (m)		40.5			38.7		
				Inle	eak			
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b	
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8	
Horizontal dis to Recep	tance Source otor (m) ⁽³⁾	42	45	41 ·	41	41	41	
Vertical dis	tance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29	
Straight dis	tance (m) ⁽³⁾	49	51	51	46	47	50	
Direction F Source (c	Receptor to degree) ⁽⁴⁾	72	64	89	86	77	97	
Lateral diffusi (r	ion coefficient n)	0	0	0	0	0	0	
Vertical diffus (r	ion coefficient n)	0	0	0	0	0	0	
	0-8 hr			5.3×	10 ⁻³			
χ/Q	8-24 hr			3.1×	10 ⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	10 ⁻³			
	96-720 hr			8.7×	10⁻⁴			

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 6 of 8)

	la nta				RCP rotor sei	zure accident		.	
Accio	ients				TS	SC			
	Locations			Main stea	m relief valve	and safety val	ve releas	7 -64	-) \/ +
	(1)	6 of the Main steam	e VVest relief valve)	/ of the west (Main steam safety value)		6 OT THE WEST (Main steam relief valve)		/ of the West (Main steam safety value	
Sources	Release	(Main Steam						Sincer Clouin	
	heights (m) ⁽²⁾	40).5	38.7		40	.5	38	3.7
			Inta	ake			Inle	eak	
	Locations	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
Receptors		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizonta Source to (m	l distance Receptor) ⁽³⁾	69	69 60		61	69	60	72	61
Vertical dist	ance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11
Straight dist	tance (m) ⁽³⁾	70	61	73	62	70	61	73	62
Direction R Source (c	Receptor to legree) ⁽⁴⁾	121	98	125	103	121	98	125	103
Lateral coeffici	diffusion ent (m)	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
	0-8 hr		1.7×	^{•10⁻³}			1.7×	<10 ⁻³	
χ/Q	8-24 hr		9.9>	×10 ⁻⁴			9.9×	×10 ⁻⁴	
(s/m³) ⁽⁶⁾	24-96 hr		6.3>	×10 ⁻⁴			6.3×	×10 ⁻⁴	
	96-720 hr		2.8>	×10 ⁻⁴		2.8×10 ⁻⁴			

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 7 of 8)

A a a i	Accidents				RCP rotor sei	zure accident			<u> </u>	
ACCIO	Jenis				TS	SC				
	Locations			Main stean	n relief valve a	nd safety valve releases				
		6 of th	e East	7 of th	e East	6 of th	e East	7 of the East		
Sources	<u>.</u>	(Main steam	relief valve)	(Main steam	(Main steam safety valve)		relief valve)	(Main steam safety valve		
	Release			38.7			_			
	neights	40).5			40	0.5	38	3.7	
	(11)		Inta	ake			Inle	eak		
				[Auxiliary	Auxiliarv	Auxiliarv	Auxiliary	
	Locations (1)	TSC HVAC	TSC HVAC	TSC HVAC	TSC HVAC	building	building	building	building	
		intake	intake	intake	intake	HVAC	HVAC	HVAČ	HVAČ	
Recentors						intake	intake	intake	intake	
Receptors		c of the	c of the	c of the	c of the	c of the	c of the	c of the	c of the	
		North	South	North	South	North	South	North	South	
	Receptor	07.4	07.4	07.4	07.4	07.4	a- 4			
	$(m)^{(2)}$	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizonta	l distance									
Source to	Receptor	84	76	86	77	84	76	86	77	
(m) ⁽³⁾							•••		
Vertical dist	tance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11	
Straight dist	tance (m) ⁽³⁾	85	77	87	78	85	77	87	78	
Direction F	Receptor to	115	96	119	100	115	96	119	100	
Source (c	legree) (4)	110						110	100	
Lateral	diffusion	0	0	0	0	0	0	0	0	
Vortical	ent (m) diffusion									
coefficient (m)		0	0	0	0	0	0	0	0	
	0-8 hr		1.7×	10 ⁻³			1.7×	10 ⁻³	·	
χ/Q	8-24 hr		9.9×	10-4			9.9×	10 ⁻⁴		
(s/m ³) ⁽⁶⁾	24-96 hr		6.3×	:10 ⁻⁴			6.3×	10 ⁻⁴		
	96-720 hr		2.8×	10 ⁻⁴	-	2.8×10 ⁻⁴				

Table 02.03.04-1(2) Combination of Sources and Receptors for RCP Rotor Seizure Analysis in the DCD (Sheet 8 of 8)

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Table	2.03.04-1(3) C		TO Source	s and Recep		Liection Ac	oident	ysis in the L	CD (Sheet 1	0[11]
Ac	cidents				KU		cident			
									·	
	Locations ⁽¹⁾					Plant Vent 9				
Sources	Release heights (m)					69.8				
		Inta	ake				Inleak	·		
Receptors .	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b
	Receptor heights (m)	17.1	17.1	16.2	17.1	16.2	17.1	27.1	27.1	9.8
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	68	56	63	68	50	56	55	60	37
Vertical of	listance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52	-43	-43	-60
Straight o	distance (m) ⁽³⁾	86	77	83	86	73	77	69	74	71
Direction Source	n Receptor to e (degree) ⁽⁴⁾	321	21	317	321	24	21	92	65	33
Latera coefi	al diffusion ficient (m)	0	0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0
	0-8 hr	1.1×	×10 ⁻³				1.4×10 ⁻³			
x/Q	8-24 hr	6.6×	·10 ⁻⁴	·			8.0×10 ⁻⁴			
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	×10 ⁻⁴				5.1×10 ^{-⁴}			
	96-720 hr	1.9×	×10 ⁻⁴				2.2×10 ⁻⁴			

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Table 02.03.04-1(3) Combination of Sources and Re	Receptors for Rod Ejection	Accident Analysis in the I	DCD (Sheet 2 of 11)

Accidents					Ro	d Ejection Ac	cident			
						MCR				
	(4)				Ground level	containment	release poin	t ⁽⁵⁾		
	Locations ("	2 of the	2 of the	1 of the	2 of the	1 of the	2 of the	3 of the	3 of the	4
Sources	Deleger	East	Vvest	East	East	vvest	vvest	Νοπη	South	
	Release heights (m) ⁽²⁾					49.4				
		Inta	ake				Inleak			
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1	27.1	27.1	9.8
Horizo Source to	ntal distance Receptor (m) ⁽³⁾	32	32	27	32	27	32	44	46	17
Vertical	distance (m) ⁽³⁾	-32	-32	-33	-32	-33	-32	-22	-22	-39
Straight	distance (m) ⁽³⁾	45	45	42	45	42	45	49	51	43
Directic Sourc	n Receptor to e (degree) ⁽⁴⁾	325	35	320	325	40	35	98	75	53
Lateral dif	fusion coefficient (m)	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98	7.98
Vertio coe	cal diffusion fficient (m)	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03	5.03
	0-8 hr	2.2×	10 ⁻³				2.4×10 ⁻³			
χ/Q	8-24 hr	1.3×	10 ⁻³				1.4×10⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr	8.3×	10 ⁻⁴				9.1×10 ⁻⁴			
	96-720 hr	3.6×	±10 ⁻⁴				4.0×10 ⁻⁴			
		• .								

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10010	danta	Rod Ejection Accident								
ACCI	dents	•	M	CR						
	Lastiana		Main steam relief valve a	and safety valve releases	· · · · · · · · · · · · · · · · · · ·					
	Locations (1)	6 of the East	7 of the East	6 of the West	7 of the West					
Sources		(Main steam relief valve)	(Main steam safety valve)	(Main steam relief valve)	(Main steam safety valve)					
Obdices	Release									
	heights (m)	40.5	38.7	40.5	38.7					
			Int	ake						
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake					
Receptors		a of the East	a of the East	a of the West	a of the West					
	Receptor heights (m)	17.1	17.1	17.1 [.]	17.1					
Horizonta Source to (m	al distance c Receptor 1) ⁽³⁾	31	26	31	26					
Vertical dis	tance (m) ⁽³⁾	-23	-21	-23	-21					
Straight dis	stance (m) ⁽³⁾	39	33	39	33					
Direction I Source (Receptor to degree) ⁽⁴⁾	309	291	51	69					
Lateral coeffic	diffusion ient (m)	0	0	0	0					
Vertical coeffic	diffusion ient (m)	0	0	0	0					
	0-8 hr	· · · · · · · · · · · · · · · · · · ·	5.3	.3×10 ⁻³						
χ/Q	8-24 hr		3.1	×10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr	•	2.0*	×10 ⁻³						
	96-720 hr		8.7	×10 ⁻⁴						

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 3 of 11)

Table	JZ.U3.04-1(3)	combination of Sources a	ind Receptors for Rod Ejec	tion Accident Analysis in	the DCD (Sheet 4 of 11)					
Acci	dents		Rod Ejecti	on Accident						
			M	CR						
	Locations		Main steam relief valve a	and safety valve releases						
	(1)	6 of the West	7 of the West	6 of the East	7 of the East					
Sources		(Main steam relief valve)	(Main steam safety valve)	(Main steam relief valve)	(Main steam safety valve)					
	Release	10.5	<u> </u>	10.5						
	heights (m)	40.5	38.7	40.5	38.7					
		Intake								
	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake					
Receptors		a of the East	a of the East	a of the West	a of the West					
	Receptor heights (m)	17.1	17.1	17.1	17.1					
Horizonta Source to (m	al distance o Receptor n) ⁽³⁾	48	48 41 45		41					
Vertical dis	tance (m) ⁽³⁾	-23	-21	-23	-21					
Straight dis	stance (m) ⁽³⁾	53	47	51	47					
Direction I Source (Receptor to degree) ⁽⁴⁾	294	283	64	77					
Lateral coeffic	diffusion ient (m)	0	0	0	0					
Vertical coeffic	diffusion ient (m)	0	0	0	0					
	0-8 hr		5.33	×10 ⁻³						
χ/Q	8-24 hr		3.1>	×10 ⁻³						
(s/m³) ^(o)	24-96 hr		2.0>	×10 ⁻³						
	96-720 hr		8.7>	×10 ⁻⁴						

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 4 of 11)

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Tal	02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 5 of 11)	
	Pod Fightion Appident	

Accidents			Rod Ejectio	on Accident		
· · ·			M	CR	· · · ·	
	(1)	Main stear	n relief valve a	ind safety valve	e releases	
_	Locations ()	6 of th	e East	7 of the East		
Sources		(Main steam	relief valve)	(Main steam	safety valve)	
	Release heights (m) ⁽²⁾	40).5	38.7		
			Inle	eak		
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	
		d of the North-East	d of the South-East	d of the North-East	d of the South-East	
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1	
Horizo Source to	ontal distance Receptor (m) ⁽³⁾	27	31	24	26	
Vertical	distance (m) ⁽³⁾	-24	-23	-22	-21	
Straight	distance (m) (3)	36	39	33	33	
Directio Sourc	on Receptor to e (degree) ⁽⁴⁾	299	309	277	291	
Lateral diffusion coefficient (m)		0	0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	
	0-8 hr		5.3×	×10 ⁻³		
χ/Q	8-24 hr		3.1×	×10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	×10 ⁻³		
	96-720 hr		8.7×	×10 ⁻		

Accidents				Rod Ejection	on Accident		
				M	CR	-	
Sources	Locations ⁽¹⁾	M (Main	lain steam r 6 of the Wes steam relief	elief valve a t valve)	nd safety va (Main s	alve release 7 of the Wes steam safety	is it v valve)
	Release heights (m) ⁽²⁾		40.5			38.7	
Receptor	Locations ⁽¹⁾	Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	Inle Reactor building door	eak Class 1E electrical room HVAC intake d of the	Class 1E electrical room HVAC intake ⁽⁸⁾ d of the	Reactor building door
	December	North- West	South- West	b	North- West	South- West	b
	Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8
Horizo Source to	ontal distance o Receptor (m) ⁽³⁾	27	31	24	24	26	24
Vertical	distance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29
Straight	distance (m) ⁽³⁾	36	39	39	33	33	38
Directi Sourc	on Receptor to ce (degree) ⁽⁴⁾	61	51	88	83	69	101
Lateral di	ffusion coefficient (m)	0	0	0	0	. 0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0
	0-8 hr			5.3×	×10 ⁻³		
χ/Q	8-24 hr			3.1×	10 ⁻³		
(s/m³) ⁽⁶⁾	24-96 hr			2.0×	×10 ⁻³	P1-1	
	96-720 hr			8.7×	×10 ⁻		

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 6 of 11)

Table 02.03.04-1(3) C	ombination of Sources and	d Receptors for Ro	d Ejection Accide	nt Analysis in the D	CD (Sheet 7 of 11)
		D	ad Eigetian Assider	4	

$ \begin{array}{ c c c c c c c } \hline Rod Ejection Accident \\ \hline MCR \\ \hline MCR \\ \hline MCR \\ \hline MCR \\ \hline Main steam relief valve and safety valve releases \\ \hline 7 of the West \\ \hline (Main steam relief valve) \\ \hline Release heights (m)^{(2)} \\ \hline Release heights (m)^{(2)} \\ \hline Release heights (m)^{(2)} \\ \hline Class 1E \\ electrical \\ room HVAC \\ room HVA$	02.03.04-1(3) Con	mbinatio	n of Sources and	d Receptors f	or Rod Ejectic	on Accident A	nalysis in the	DCD (Sheet 7 of 11)
MCRMain steam relief valve and safety valve releases 6 of the West (Main steam relief valve)SourcesLocations (1)Main steam relief valve 6 of the West (Main steam relief valve)(Main steam safety valve) (Main steam safety valve)Release heights (m) (2)40.538.7ReceptorsLocations (1)Class 1E electrical room HVAC room HVAC <td></td> <td>٨٥</td> <td>cidants</td> <td></td> <td>Rod Ejectio</td> <td>on Accident</td> <td></td> <td></td>		٨٥	cidants		Rod Ejectio	on Accident		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$		AC	cidents		M			
Locations (1)7 of the West (Main steam relief valve)Sources7 of the West (Main steam safety valve)Release heights (m) (2)40.538.7ReceptorsLocations (1)Class 1E 				Main stear	n relief valve a	e releases		
Sources(Main steam relief valve) (Main steam safety valve)Release heights (m) (2)40.538.7InleakInleakClass 1E electrical room HVAC intakeClass 1E electrical room HVAC intakeClass 1E electrical room HVAC intakeClass 1E electrical room HVAC intakeClass 1E electrical room HVAC intakeReceptor heights (m) (2)Receptor 16.2116.217.116.217.1Horizontal distance Source to Receptor (m) (3)44484141Vertical distance (m) (3)51534647Direction Receptor to Source (degree) (4)287294274283Lateral diffusion coefficient (m)0000Vertical diffusion coefficient (m)0000Vertical diffusion coefficient (m)0000Vertical diffusion coefficient (m)0000Vertical diffusion coefficient (m)0000Vertical diffusion (stm3) (6)00000Vertical diffusion (stm3) (6)00000			Locations ⁽¹⁾	6 of the West		7 of the West		
Release heights (m) (2) 40.5 38.7 ReceptorsLocations (1)Class 1E electrical room HVACClass 1E electrical room HVAC intake (7)Class 1E electrical room HVAC intake (7)Horizontal distance Source to Receptor (m)(3)16.217.116.217.1Horizontal distance (m)(3)-24-23-22-21Straight distance (m)(3)51534647Direction Receptor to Source (degree) (4)287294274283Lateral diffusion coefficient (m)0000V(0) (6)8-24 hr 5.3×10^3 5.3×10^3 5.3×10^3	S	Sources		(Main steam	relief valve)	(Main steam	safety valve)	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			Release heights (m) ⁽²⁾	40).5	38	3.7	
ReceptorsLocations (1)Class 1E electrical room HVAC intakeClass 1E 					Inle	eak		
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$				Class 1E	Class 1E	Class 1E	Class 1E	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$			(1)	electrical	electrical	electrical	electrical	
$\begin{array}{ c c c c c c c } \hline & d \ of \ the \\ \hline North-East \\ \hline South-East \\ \hline South-Eas$	Re	eceptors	Locations ()	room HVAC intake	room HVAC intake ⁽⁷⁾	room HVAC intake	room HVAC intake ⁽⁷⁾	
$\begin{tabular}{ c c c c c c c } \hline & North-East & South-East & South-East & South-East & North-East & South-East & South-East & South-East & North-East & South-East & North-East & South-East & North-East & South-East & South-East & North-East & South-East & North-East & South-East & South-East & North-East & South-East & North-East & South-East & North-East & South-East & North-East & North-East & North-East & South-East & North-East & South-East & North-East & North-East & South-East & North-East & North$		•		d of the	d of the	d of the	d of the	
$\begin{array}{ c c c c c c c c } \hline Receptor \\ heights (m)^{(2)} & 16.2 & 17.1 & 16.2 & 17.1 \\ \hline Horizontal distance \\ Source to Receptor (m)^{(3)} & 44 & 48 & 41 & 41 \\ \hline Vertical distance (m)^{(3)} & -24 & -23 & -22 & -21 \\ \hline Straight distance (m)^{(3)} & 51 & 53 & 46 & 47 \\ \hline Direction Receptor to \\ Source (degree)^{(4)} & 287 & 294 & 274 & 283 \\ \hline Lateral diffusion coefficient \\ (m) & 0 & 0 & 0 \\ \hline Vertical diffusion \\ coefficient (m) & 0 & 0 & 0 \\ \hline Vertical diffusion \\ coefficient (m) & 0 & 0 & 0 \\ \hline Vertical diffusion \\ (s/m^3)^{(6)} & 24-96 \ hr & 2.0\times10^3 \\ \hline \end{array}$				North-East	South-East	North-East	South-East	•
$ \begin{array}{ c c c c c c c } \hline Horizontal distance \\ \hline Source to Receptor (m)^{(3)} & 44 & 48 & 41 & 41 \\ \hline Vertical distance (m)^{(3)} & -24 & -23 & -22 & -21 \\ \hline Straight distance (m)^{(3)} & 51 & 53 & 46 & 47 \\ \hline Direction Receptor to \\ Source (degree)^{(4)} & 287 & 294 & 274 & 283 \\ \hline Lateral diffusion coefficient \\ (m) & 0 & 0 & 0 & 0 \\ \hline Vertical diffusion \\ coefficient (m) & 0 & 0 & 0 & 0 \\ \hline Vertical diffusion \\ coefficient (m) & 0 & 0 & 0 & 0 \\ \hline Vertical diffusion \\ coefficient (m) & 0 & 0 & 0 & 0 \\ \hline Vertical diffusion \\ (s/m^3)^{(6)} & 24-96 \ hr & 2.0 \times 10^{-3} \\ \hline \end{array} $			Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1	
Vertical distance (m) $^{(3)}$ -24 -23 -22 -21 Straight distance (m) $^{(3)}$ 51 53 46 47 Direction Receptor to Source (degree) $^{(4)}$ 287 294 274 283 Lateral diffusion coefficient (m) 0 0 0 0 Vertical diffusion coefficient (m) 0 0 0 0 χ/Q (s/m ³) $^{(6)}$ 8-24 hr 5.3×10^{-3} 5.3×10^{-3}	S	Horizontal distance Source to Receptor (m) ⁽³⁾		44	48	41	41	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Vertical d	listance (m) ⁽³⁾	-24	-23	-22	-21	
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		Straight o	distance (m) ⁽³⁾	51	53	46	47	
Lateral diffusion coefficient (m)0000Vertical diffusion coefficient (m)0000 $Vertical diffusioncoefficient (m)0000Vertical diffusioncoefficient (m)0000Vertical diffusioncoefficient (m)0000Vertical diffusioncoefficient (m)0000V/Q(s/m3) (6)B-24 hr5.3 \times 10^{-3}0$		Directior Source	n Receptor to e (degree) ⁽⁴⁾	287	294	274	283	
Vertical diffusion coefficient (m) 0 0 0 0 $Vertical diffusioncoefficient (m) 0 0 0 0 Vertical diffusioncoefficient (m) 0 0 0 0 0 Vertical diffusioncoefficient (m) 0 0 0 0 0 V/Q 8-24 hr 3.1 \times 10^{-3} 0 0 0 (s/m^3)^{(6)} 24-96 hr 2.0 \times 10^{-3} 0 0 0 $	La	Lateral diffusion coefficient (m) Vertical diffusion coefficient (m)		0	0	0	0	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $				0	0	0	0	
$\begin{array}{c c} X/Q & 8-24 \text{ hr} & 3.1 \times 10^{-3} \\ \hline (s/m^3)^{(6)} & 24-96 \text{ hr} & 2.0 \times 10^{-3} \end{array}$			0-8 hr		5.3×	10 ⁻³		
$(s/m^3)^{(6)}$ 24-96 hr 2.0×10 ⁻³		x/Q	8-24 hr		3.1×	10 ⁻³		
	(s/	$(m^3)^{(6)}$	24-96 hr		2.0×	10 ⁻³		
96-720 hr 8.7×10 ⁻⁴			96-720 hr		8.7×	:10⁻⁴		

Accidents				Rod Ejection	on Accident				
				M	CR				
Sources	Locations (1)	 (Mair	Main stear 6 of the East 1 steam relief	m relief valve a valve)	Ind safety valve_releases 7 of the East (Main steam safety valve)				
	Release heights (m) ⁽²⁾		40.5		38.7				
	_	Inleak							
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door		
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b		
	Receptor heights (m) ⁽²⁾	16.2	17.1	9.8	16.2	17.1	9.8		
Horizo Source to	ontal distance Receptor (m) ⁽³⁾	42	45	41	41	41	41		
Vertical	distance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29		
Straight	distance (m) (3)	49	51	51	46	47	50		
Directic Sourc	on Receptor to e (degree) ⁽⁴⁾	72	64	89	86	77	97		
Lateral dif	fusion coefficient (m)	0	0	0	0	0	0		
Verti coe	Vertical diffusion coefficient (m)		0	0	0	0	0		
	0-8 hr			5.3×	×10 ⁻³				
χ/Q	8-24 hr			3.1×	10 ⁻³				
(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	:10 ⁻³				
	96-720 hr			8.7×	:10⁻⁴				

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 8 of 11)

٨					Rod Ejec	tion Accident			
AC	cidents					TSC	-		
	Locations (1)	Plant vent		Groun contai release	Ground level containment release point ⁽⁵⁾		vent	Groun contai release	d level nment point ⁽⁵⁾
Sources		{	9	3 of the North	3 of the South	{	9	3 of the North	3 of the South
	Release heights (m) ⁽²⁾	69	9.8	49	9.4	69	9.8	49	9.4
				ntake			inl	eak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	55	60	44	46	55	60	44	46
Vertical of	distance (m) ⁽³⁾	-43	-43	-22	-22	-43	-43	-22	-22
Straight o	distance (m) ⁽³⁾	69	74	49	51	69	74	49	51
Direction Source	n Receptor to e (degree) ⁽⁴⁾	92	65	98	75	92	65	98	75
Later: coef	al diffusion ficient (m)	0	0	· 0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	о	0	0	0	0
	0-8 hr	1.7×	10 ⁻³	1.9×	:10 ⁻³	1.7×10 ⁻³		1.9×10 ⁻³	
x/Q	8-24 hr	9.9×	×10 ⁻⁴	1.1×	:10 ⁻³	9.9×	:10 ⁻⁴	1.1×	:10 ⁻³
(s/m ³) ⁽⁶⁾	24-96 hr	6.3×	×10 ⁻⁴	7.2×	:10 ⁻⁴	6.3×10 ⁻⁴		7.2×10 ⁻⁴	
	96-720 hr	2.8×	×10 ⁻⁴	3.2×	×10 ⁻⁴	2.8×	×10 ⁻⁴	3.2×10 ⁻⁴	

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 9 of 11)

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					Rod Ejectic	on Accident					
					TS	SC .					
	Locations ⁽¹⁾		Main steam relief valve and safety valve releases								
Sources	Locations	6 of th (Main steam	e West relief valve)	7 of th (Main steam	e West safety valve)	6 of the West (Main steam relief valve)		7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40).5	38	9.7	40).5	38	9.7		
			Inta	ake			Inle	eak			
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake		
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South		
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1		
Horizonta to Re	I distance Source eceptor (m) ⁽³⁾	69	60	72	61 _.	69	60	72	61		
Vertical	distance (m) (3)	-13	-13	-11	-11	-13	-13	-11	-11		
Straight	distance (m) ⁽³⁾	70	61	73	62	70	61	73	62		
Directio Sourc	on Receptor to ce (degree) ⁽⁴⁾	121	98	125	103	121	98	125	103		
Lateral di	ffusion coefficient (m)	0	0	0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0		
0-8 hr			1.4×	:10 ⁻³			1.4×	10 ⁻³			
χ/Q	8-24 hr		8.0×	:10⁻⁴		8.0×10 ⁴					
(s/m ³) ⁽⁶⁾	24-96 hr		5.1×	:10 ⁻⁴		5.1×10 ⁻⁴					
	96-720 hr		2.2×	:10 ⁻⁴			2.2×	×10 ⁻⁴			

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Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 10 of 11)

2.3.4-32

Δ					Rod Ejectic	on Accident				
					TS	SC				
		Main steam relief valve and safety valve releases								
Sources	Locations	6 of th (Main steam	e East relief valve)	7 of th (Main steam	e East safety valve)	6 of the East (Main steam relief valve)		7 of the East (Main steam safety valve)		
	Release heights (m) ⁽²⁾	40	0.5	38	8.7	40	0.5	38	3.7	
			Inta	ake			Inle	eak		
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizonta to Re	I distance Source eceptor (m) ⁽³⁾	84	76	86	77	84	76	86	77	
Vertical	distance (m) ⁽³⁾	-13	-13	-11	-11	-13	-13	-11	-11	
Straight	distance (m) ⁽³⁾	85	77	87	78	85	77	87	78	
Directio Sourc	on Receptor to ce (degree) ⁽⁴⁾	115	96	119	100	115	96	119	100	
Lateral dif	ffusion coefficient (m)	0	0	0	0	0	0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	
0-8 hr			1.4×	10 ⁻³		1.4×10 ⁻³				
χ/Q	8-24 hr		8.0×	10⁻⁴		8.0×10 ⁻⁴				
(s/m ³) ⁽⁶⁾	24-96 hr		5.1×	10 ⁻⁴		5.1×10 ⁻⁴				
	96-720 hr		2.2×	10 ⁻⁴			2.2×	:10 ⁻⁴		

Table 02.03.04-1(3) Combination of Sources and Receptors for Rod Ejection Accident Analysis in the DCD (Sheet 11 of 11)

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	· · · ·	Failure of Small Lines Carrying Primary Coolant Outside Containment								
Ac	ccidents				MCR					
Sources	Locations ⁽¹⁾			Pl	ant vent					
	Release heights (m) ⁽²⁾				69.8					
		Inta	ake		Inl	eak				
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾			
		a of the East	a of the West	d of the North- East	d of the South-East	d of the North- West	d of the South-West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1			
Horizor Source to	ntal distance Receptor (m) ⁽³⁾	68	56	63	68	50	56			
Vertical o	distance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52			
Straight o	distance (m) ⁽³⁾	86	77	83	86	73	77			
Direction Source	n Receptor to e (degree) ⁽⁴⁾	321	21	317	321	24	21			
Latera coeff	al diffusion ficient (m)	0	0	0	0	0	0			
Vertic coeff	al diffusion ficient (m)	0	0	0	0	0	0			
	0-8 hr	1.1×	×10 ⁻³		1.2×10 ⁻³					
χ/Q	8-24 hr	6.6×	×10 ⁻⁴		8.0×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	×10 ⁻⁴		5.1>	×10 ⁻⁴				
	96-720 hr	1.9×	×10 ⁻⁴		2.2>	×10 ⁻⁴				

Table 02.03.04-1(4) Combination of Sources and Receptors for Failure of Small Lines Carrying Primary Coolant Outside Containment analyses in the DCD(Sheet 1 of 2)

Accidents		Failure of Small Lines Carrying Primary Coolant Outside Containment							
		MCR			TSC				
	Locations ⁽¹⁾	Plant vent			Plant vent				
Sources		9			9				
	Release heights (m) ⁽²⁾	69.8			69.8				
		Inleak			Int	ake	inleak		
Receptors	Locations ⁽¹⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	
		c of the North	c of the South	b	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	9.8	27.1	27.1	27.1	27.1	
Horizontal distance Source to Receptor (m) ⁽³⁾		55	60	37	55	60	55	60	
Vertical	distance (m) (3)	-43	-43	-60	-43	-43	-43	-43	
Straight	distance (m) (3)	69	74	71	69	74	69	74	
Direction Receptor to Source (degree) (4)		92	65	33	92	65	92	65	
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	
	0-8 hr	1.4×10 ⁻³		1.4×10 ⁻³		1.4×10 ⁻³			
x/Q	8-24 hr	8.0×10 ⁻⁴			8.0×10 ⁻⁴		8.0×10 ⁻⁴		
(s/m ³) ⁽⁶⁾	24-96 hr	5.1×10 ⁻⁴			5.1×10 ⁻⁴		5.1×10 ⁻⁴		
	96-720 hr	2.2×10 ⁴			2.2×10 ⁻⁴		2.2>	2.2×10 ⁻⁴	

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Table 02.03.04-1(4) Combination of Sources and Receptors for Failure of Small Lines Carrying Primary Coolant Outside Containment analyses in the DCD (Sheet 2 of 2)

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Accidents		SGTR						
		MCR						
	Locations	Main steam relief valve and safety valve releases						
Sources	(1)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40.5	40.5 38.7 40.5		38.7			
		Intake						
Receptors	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake			
	6	a of the East	a of the East	a of the West	a of the West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal distance Source to Receptor (m) ⁽³⁾		31	26	31	26			
Vertical distance (m) (3)		-23	-21	-23	-21			
Straight distance (m) (3)		39	33	39	33			
Direction Receptor to Source (degree) ⁽⁴⁾		309	291	51	69			
Lateral diffusion coefficient (m)		0	0	0	0			
Vertical diffusion coefficient (m)		0	0	0	0			
χ/Q (s/m ³) ⁽⁶⁾	0-8 hr	5.3×10 ⁻³						
	8-24 hr		3.1×	10 ⁻³				
	24-96 hr	2.0×10 ⁻³						
	96-720 hr	8.7×10 ⁻⁴						

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 1 of 8)

Accidents		SGTR MCR						
Sources	(1)	6 of the West (Main steam relief valve)	7 of the West (Main steam safety valve)	6 of the East (Main steam relief valve)	7 of the East (Main steam safety valve)			
	Release heights (m) ⁽²⁾	40.5	38.7	40.5	38.7			
		Intake						
Receptors	Locations	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake	MCR HVAC intake			
	5	a of the East a of the East a of the West		a of the West	a of the West			
	Receptor heights (m) ⁽²⁾	17.1	17.1	17.1	17.1			
Horizontal distance Source to Receptor (m) ⁽³⁾		48	41	45	41			
Vertical distance (m) (3)		-23	-21	-23	-21			
Straight distance (m) (3)		53	47	51	47			
Direction Receptor to Source (degree) ⁽⁴⁾		294	283	64	77			
Lateral diffusion coefficient (m)		0	0	0	0			
Vertical diffusion coefficient (m)		0	0	0	0			
χ/Q (s/m ³) ⁽⁶⁾	0-8 hr		5.3×	5.3×10 ⁻³				
	8-24 hr		3.1×	3.1×10 ⁻³				
	24-96 hr	2.0×10 ⁻³						
	96-720 hr	8.7×10 ⁻⁴						

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 2 of 8)

Accid	ents	SGTR					
		MCR					
	Locations ⁽¹⁾	Main steam relief valve 6 of the East (Main steam relief valve)		and safety valve_releases 7 of the East (Main steam safety valve)			
Sources	Release heights (m)	40.5		38.7			
	Locations ⁽¹⁾	Inleak					
Bogontom		Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾		
Receptors		d of the North-East	d of the South-East	d of the North-East	d of the South-East		
	Receptor heights (m)	16.2	17.1	16.2	17.1		
Horizontal distance Source to Receptor (m) ⁽³⁾		27	31	24	26		
Vertical dist	ance (m) ⁽³⁾	-24	-23	-22	-21		
Straight dist	ance (m) ⁽³⁾	36	39	33	33		
Direction Rece (degree	ptor to Source ee) ⁽⁴⁾	299	309	277	291		
Lateral diffusion	coefficient (m)	0	0	0	0		
Vertical diffusion	coefficient (m)	0	0	0	0		
	0-8 hr	5.3×10 ⁻³					
X/Q	8-24 hr	3.1×10 ⁻³					
(s/m ³) ⁽⁶⁾	24-96 hr	2.0×10 ⁻³					
	96-720 hr	8.7×10 ⁻⁴					

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 3 of 8)
Accio	lents			SG	STR		
				M	CR	n - ne 1984	
	Locations (1)	(84-)	Main stear 6 of the West	n relief valve a	nd safety valve	e releases 7 of the West	
Sources	Release heights (m)		40.5		(wam	38.7	
				Inl	eak		
Decenter	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door
Receptors		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8
Horizontal dista Recepto	ance Source to or (m) ⁽³⁾	27	31	24	24	26	24
Vertical dist	ance (m) ⁽³⁾	-24	-23	-30	-22	-21	-29
Straight dist	ance (m) ⁽³⁾	36	39	39	33	33	38
Direction Rece (degree	Direction Receptor to Source (degree) ⁽⁴⁾		51	88	83	69	101
Lateral diffusion	coefficient (m)	0	0	0	0	0	0
Vertical diffusior	n coefficient (m)	0	0	0	0	0	0
	0-8 hr			5.3>	<10 ⁻³	·	
x/Q	8-24 hr			3.1>	•10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr			2.0>	<10 ⁻³		
	96-720 hr			8.7>	<10 ⁻⁴	<u>.</u>	

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Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 4 of 8)

Δ	ccidents		SGTR							
		-	M	CR						
Sources	Locations ⁽¹⁾	Main stear 6 of th (Main steam	n relief valve a e West relief valve)	nd safety valv 7 of th (Main steam	e_releases e West safety valve)					
	Release heights (m) ⁽²⁾	40).5	38	8.7					
Receptors	Receptors		Inte Class 1E electrical room HVAC intake ⁽⁷⁾ d of the South-East	eak Class 1E electrical room HVAC intake d of the North-East	Class 1E electrical room HVAC intake ⁽⁷⁾ d of the South-East					
	Receptor heights (m) ⁽²⁾	16.2	17.1	16.2	17.1					
Horizo Source to	Horizontal distance Source to Receptor (m) ⁽³⁾		48	· 41	41					
Vertical	distance (m) ⁽³⁾	-24	-23	-22	-21					
Straight	distance (m) (3)	51	53	46	47					
Directic Sourc	Direction Receptor to Source (degree) (4)		294	274	283					
Lateral diffusion coefficient (m)		0	0	0	0					
Vertical diffusion coefficient (m)		0	0	0	0					
0-8 hr			5.3×	:10 ⁻³						
χ/Q	8-24 hr		3.1×	:10 ⁻³						
(s/m ³) ⁽⁶⁾	24-96 hr		2.0×	:10 ⁻³						
	96-720 hr	8.7×10 ⁻⁴								

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 5 of 8)

Accidents			SG	TR				
				M	CR			
	Locations (1)		6 of the East in steam relief v	alve)	(Mai	7 of the East n steam safety y	alve)	
Sources	Release heights (m)		40.5			38.7		
				Inle	eak		Class 1E electrical Reactor oom HVAC building door intake ⁽⁸⁾ d of the b South-West b	
Receptors	Locations ⁽¹⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door	
		d of the North-West	d of the South-West	b	d of the North-West	d of the South-West	b	
	Receptor heights (m)	16.2	17.1	9.8	16.2	17.1	9.8	
Horizontal distar Receptor	nce Source to r (m) ⁽³⁾	42	45	41	41	41	41	
Vertical dista	nce (m) ⁽³⁾	-24	-23	-30	-22	-21	-29	
Straight dista	ince (m) ⁽³⁾	49	51	51	46	47	50	
Direction Receptor to Source (degree) ⁽⁴⁾		72	64	89	86	77	97	
Lateral diffusion coefficient (m)		. 0	0	0	0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	0	0	
	0-8 hr			5.3×	10 ⁻³			
χ/Q	8-24 hr			3.1×	×10 ⁻³			
(s/m ³) ⁽⁶⁾	24-96 hr			2.0×	10 ⁻³			
	96-720 hr			8.7×	×10 ⁻⁴			

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 6 of 8)

Δ	coidents				SC	STR			
					T	SC			
				Main steam	relief valve a	and safety va	lve releases	5	
Sources		6 of the West (Main steam relief valve)		7 of th (Main ste val	7 of the West (Main steam safety valve)		6 of the West (Main steam relief valve)		e West am safety ve)
	Release heights (m) ⁽²⁾	40.5		38	38.7).5	38	3.7
			Inta	ake			Inle	eak	
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1
Horizonta to Re	distance Source ceptor (m) ⁽³⁾	69	60	72	61	69	60	72	61
Vertical	distance (m) (3)	-13	-13	-11	-11	-13	-13	-11	-11
Straight	distance (m) (3)	70	61	73	62	70	61	73	62
Direction Receptor to Source (degree) ⁽⁴⁾		121	98	125	103	121	98	125	103
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0
	0-8 hr		1.7>	<10 ⁻³			1.7>	×10 ⁻³	
x/Q 8-24 hr			9.9>	<10 ⁻⁴			9.9×	×10 ⁻⁴	
(s/m ³) ⁽⁶⁾	24-96 hr		6.3>	<10 ⁻⁴			6.3×	¢10 ^{-₄}	
	96-720 hr		2.8>	×10 ⁻⁴			2.8×	×10 ⁻⁴	

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Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 7 of 8)

Λ	ccidents				SC	TR				
					T	SC				
				Main steam	relief valve a	and safety va	lve releases	i		
Sources	Locations ⁽¹⁾	6 of the East (Main steam relief valve)		7 of th (Main ste val	7 of the East (Main steam safety valve)		6 of the East (Main steam relief valve)		e East am safety ve)	
	Release heights (m) ⁽²⁾	4().5	38	3.7	40).5	38	3.7	
			Int	ake			Inle	eak		
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	TSC HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Auxiliary building HVAC intake	
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1	
Horizontal to Re	distance Source ceptor (m) ⁽³⁾	84	76	86	77	84	76	86	. 77	
Vertical	distance (m) ⁽³⁾	-13	-13	11	-11	-13	-13	-11	-11	
Straight	distance (m) (3)	85	77	87	78	85	77	87	78	
Direction Receptor to Source (degree) ⁽⁴⁾		115	96	119	100	115	96	119	100	
Lateral diffusion coefficient (m)		0	0 -	0	0	0	· 0	0	0	
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	
0-8 hr			1.7>	<10 ⁻³		-	1.7×	10 ⁻³		
x/Q 8-24 hr			9.9>	<10 ⁻⁴			9.9×	×10 ⁻⁴		
(s/m ³) ⁽⁶⁾	$(s/m^3)^{(6)}$ 24-96 hr		6.3>	×10 ⁻⁴		,	6.3×	×10 ⁻⁴	Auxiliary building HVAC intakeAuxiliary building HVAC intakec of the Northc of the South27.127.18677-11-118778119100000000 0^4	
· -	96-720 hr		2.8>	×10 ⁻⁴			2.8×	×10 ⁻⁴		

Table 02.03.04-1(5) Combination of Sources and Receptors for Steam Generator Tube Rupture (SGTR) analyses in the DCD (Sheet 8 of 8)

A	Accidents				LOCA		_				
					MCR						
	Locations ⁽¹⁾				Plant ven	t					
Sources	Release heights (m) ⁽²⁾	69.8									
		inta	**	- • 8 - 11							
Locations ⁽¹⁾		MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door			
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	b b			
	Receptor heights (m) ⁽²⁾	17.1	17.1	16.2	17.1	16.2	17.1	9.8			
Horizonta to Re	distance Source ceptor (m) ⁽³⁾	68	56	63	68	50	56	37			
Vertical	distance (m) (3)	-52	-52	-53	-52	-53	-52	-60			
Straight	distance (m) ⁽³⁾	86	77	83	86	73	77	71			
Direction Receptor to Source (degree) (4)		321	21	317	321	24	21	33			
Lateral diffusion coefficient (m)		0	0	0	0	0	. 0	0			
Vertical diffusion coefficient (m)		0	0 ·	0	0	0	0	0			
0-8 hr		1.1×	×10 ⁻³			1.4×10 ⁻³		-			
x/Q	x/Q 8-24 hr		¢10 ⁻⁴			7.7×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	(s/m ³) ⁽⁶⁾ 24-96 hr		×10 ⁻⁴			4.9×10 ⁻⁴					
96-720 hr		1.9×	×10 ⁻⁴			2.2×10 ⁻⁴					

Table 02.03.04-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 1 of 3)

Δ	cidents				LOCA			
					MCR			
				Ground lev	el containment	release point ⁽⁵⁾		
Sources	Locations	2 of the East	2 of the West	1 of the East	2 of the East	1 of the West	2 of the West	4
	Release							
	heights (m)				49.4			
		Int	ake			Inleak		
Decenter	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Reactor building door
Receptors		a of the East	a of the West	d of the North-East	d of the South-East	d of the North-West	d of the South-West	b
	Receptor heights (m)	17.1	17.1	16.2	17.1	16.2	17.1	9.8
Horizo Source to	ntal distance Receptor (m) ⁽³⁾	32	32	27	32	27	32	17
Vertical	distance (m) ⁽³⁾	-32	-32	-33	-32	-33	-32	-39
Straight	distance (m) ⁽³⁾	45	45	42	45	42	45	43
Direction Receptor to Source (degree) ⁽⁴⁾		325	35	320	325	40	35	53
Lateral diffusion coefficient (m)		7.98	7.98	7.98	7.98	7.98	7.98	7.98
Vertical diffusion coefficient (m)		5.03	5.03	5.03	5.03	5.03	5.03	5.03
	0-8 hr	2.2>	<10 ⁻³			2.4×10 ⁻³		
x/Q 8-24 hr		1.3>	<10 ⁻³			1.4×10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr	8.3>	<10 ⁻⁴			9.1×10 ⁻⁴		
	96-720 hr	3.6>	<10 ⁻⁴			4.0×10 ⁻⁴		

Table 02.03.04-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 2 of 3)

	Accidents				LO	CA		10.0000000	1		
ACC	lidents				T	SC					
	Locations ⁽¹⁾		Plan	t vent		Ground	l level contain	ment release	point ⁽⁵⁾		
Sources				9			3 of th	e North			
	Release heights (m)		69	9.8			49	9.4			
		Int	ake	inle	eak	Inta	ake	inle	eak		
	Locations ⁽¹⁾	TSC HVAC intake									
Receptors		c of the North	c of the South								
	Receptor heights (m)	27.1	27.1	27.1	27.1	27.1	27.1	27.1	27.1		
Horizont Source to R	al distance Receptor (m) ⁽³⁾	55	60	55	60	44	46	44	46		
Vertical dis	stance (m) ⁽³⁾	-43	-43	-43	-43	-22	-22	-22	-22		
Straight di	stance (m) ⁽³⁾	69	74	69	74	49	51	49	51		
Direction Source (Receptor to (degree) ⁽⁴⁾	92	65	92	65	98	75	98	75		
Lateral diffusion coefficient (m)		· 0	0	0	0	7.98	7.98	7.98	7.98		
Vertical diffusion coefficient (m)		0	0	, O	0	5.03	5.03	5.03	5.03		
	0-8 hr		×10 ⁻³	1.4>	410 ⁻³	1.9>	×10 ⁻³	1.9>	10 ⁻³		
χ/Q	8-24 hr	8.0>	×10 ⁻⁴	8.0>	×10 ⁻⁴	1.1×	10 ⁻³	1.1>	10 ⁻³		
(s/m ³) ⁽⁶⁾	24-96 hr	5.1>	×10 ⁻⁴	5.1>	×10 ⁻⁴	7.2×	×10 ⁻⁴	7.2>	×10 ⁻⁴		
96-720 hr		2.2>	×10 ⁻⁴	2.2>	×10 ⁻⁴	3.2×	×10 ⁻⁴	3.2>	×10 ⁻⁴		

Table 02.03.04-1(6) Combination of Sources and Receptors for LOCA Analysis in the DCD (Sheet 3 of 3)

۸	Accidents			Fi	uel handling a	accident in th	ne containme	ent		<u> </u>			
AU						MCR							
	Locations ⁽¹⁾					Plant vent							
Sources			9										
	Release heights (m) ⁽²⁾					69.8							
		Inta	Intake Inleak										
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door			
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b			
	Receptor heights (m) (2)	17.1	17.1	16.2	17.1	16.2	17.1	27.1	27.1	9.8			
Horizontal d to Rece	istance Source eptor (m) ⁽³⁾	68	56	63	68	50	56	55	60	37			
Vertical di	stance (m) ⁽³⁾	-52	-52	-53	-52	-53	-52	-43	-43	-60			
Straight di	stance (m) ⁽³⁾	86	77	83	86	73	77	69	74	71			
Direction Source	Receptor to (degree) (4)	321	21	317	321	24	21	92	65	33			
Lateral diffu	sion coefficient (m)	0	0	0	· 0	0	0	0	0	0			
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0	0			
0-8 hr		1.1×	:10 ⁻³				1.4×10 ⁻³						
x/q	8-24 hr	6.6×	×10 ⁻⁴				8.0×10 ⁻⁴						
(s/m ³) ⁽⁶⁾	24-96 hr	4.2×	×10 ⁻⁴				5.1×10 ⁻⁴						
	96-720 hr	1.9×	×10 ⁻⁴				2.2×10 ⁻⁴						

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Table 02.03.04-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 1 of 3)

2.3.4-47

Δ				Fu	el handling a	ccident in the	e fuel handlin	g area				
						MCR						
	Locations (1)				F	uel handling	area					
Sources		8										
	Release heights (m) ⁽²⁾					5.8						
		Inta	ake				Inleak					
Receptors	Locations ⁽¹⁾	MCR HVAC intake	MCR HVAC intake	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁷⁾	Class 1E electrical room HVAC intake	Class 1E electrical room HVAC intake ⁽⁸⁾	Auxiliary building HVAC intake	Auxiliary building HVAC intake	Reactor building door		
		a of the East	a of the West	d of the North- East	d of the South- East	d of the North- West	d of the South- West	c of the North	c of the South	b		
	Receptor heights (m) ⁽²⁾	14.3	14.3	14.3	14.3	14.3	14.3	23.2	23.2	7.3		
Horizontal to Red	distance Source ceptor (m) ⁽³⁾	82	105	76	82	100	105	103	114	89		
Vertical	distance (m) ⁽³⁾	8.5	8.5	8.5	8.5	8.5	8.5	17	17	1.5		
Straight	distance (m) ⁽³⁾	83	105	76	83	100	105	105	115	89		
Directio Source	n Receptor to e (degree) ⁽⁴⁾	360	38	360	360	41	38	75	61	47		
Lateral diff	usion coefficient (m)	0	0	0	0	0	0	0	0	0		
Vertic coef	cal diffusion ficient (m)	0	0	0	0	0	0	0	0	0		
	0-8 hr	9.9×	×10 ⁻⁴				1.1×10 ⁻³					
x/Q 8-24 hr		5.9×	×10 ⁻⁴				6.7×10 ⁻⁴					
(s/m ³) ⁽⁶⁾	24-96 hr	3.7×	×10 ⁻⁴	-			4.3×10 ⁻⁴					
	96-720 hr	1.6×	:10⁻⁴				1.9×10 ⁻⁴					

Table 02.03.04-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 2 of 3)

	eidente	Fuel I	nandling accide	nt in the contai	nment	Fuel har	ndling accident i	n the fuel hand	lling area		
AC	cidents				TS	SC					
	Locations ⁽¹⁾		Plant	vent		Fuel handling area					
Sources			<u>ç</u>)							
	Release heights (m) ⁽²⁾		. 69	0.8			5.	8			
		Inta	ake	inle	eak	Inta	ake	inleak Auxiliary Auxiliary Building Building HVAC HVAC Intake Intake c of the c of the North South 23.2 23.2 103 114			
Receptors	Locations ⁽¹⁾	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake	TSC HVAC intake	TSC HVAC intake	Auxiliary Building HVAC Intake	Auxiliary Building HVAC Intake		
		c of the North	c of the South	c of the North	c of the South	c of the North	c of the South	c of the North	c of the South		
	Receptor heights (m) ⁽²⁾	27.1	27.1	27.1	27.1	23.2	23.2	23.2	23.2		
Horizontal o to Rec	distance Source eptor (m) ⁽³⁾	55	60	55	60	103	114	103	114		
Vertical d	istance (m) ⁽³⁾	-43	-43	-43	-43	17	17	17	17		
Straight c	listance (m) ⁽³⁾	69	74	69	74	105	115	105	115		
Directior Source	Direction Receptor to Source (degree) ⁽⁴⁾		65	92	65	75	61	75	61		
Lateral diffusion coefficient (m)		0	0	0	0	0	0	0	0		
Vertical diffusion coefficient (m)		0	0	0	0	0	0	0	0		
	0-8 hr	1.4×10 ⁻³		1.4×	10 ⁻³	6.7×	×10 ⁻⁴	6.7×	:10⁻⁴		
x/Q	8-24 hr	8.0×	:10 ⁻⁴	8.0×	10⁴	3.9×	×10 ⁻⁴	3.9×	:10⁴		
(s/m ³) ⁽⁶⁾	(s/m ³) ⁽⁶⁾ 24-96 hr		:10 ⁻⁴	5.1×	10-4	2.5×	×10 ⁻⁴	2.5×	·10 ⁻⁴		
	96-720 hr		:10 ⁻⁴	2.2×	10⁴	1.1×	•10⁻⁴	1.1×	:10 ⁻⁴		

Table 02.03.04-1(7) Combination of Sources and Receptors for Fuel Handling Accident Analysis in the DCD (Sheet 3 of 3)

2.3.4-49

NOTES:

- (1) The inside of a parenthesis shows the source locations and receptor locations of the Figure 02.03.04-1
- (2) The height is from the ground level. The ground level is E.L.= 2' -8"
- (3) These values are the distance differences in a unit of meter from the source to the receptor. After the distance differences are calculated from the locations of the source and the receptor in a unit of feet, the resulted distance differences are rounded off. Those rounded numbers of the distance differences are converted to those in a unit of meter. Therefore, note that these values are a bit different from the difference between the source height and receptor height in a unit of meter indicated in the above (2), because the source height and receptor height in a unit of meter are directly converted from those in a unit of feet, without any calculation in a unit of feet
- (4) The angle of receptors from Plant North centering on sources (Direction increases in a clockwise fashion based on the Plant North, i.e. The Plant North is 0 degree.)
- (5) Area source, which is determined from the method in Sections C.3.2.4.4 and C.3.2.4.5 of RG 1.194.
- (6) These χ/Q values are for US-APWR DCD Chapter15.

- The χ/Q values of MCR can't be directly calculated by ARCON96 itself because there is no site specific meteorological data in the stage of the DCD. Therefore, the diffusion equations described in ARCON96 (e.g. Revision 1 to NUREG-6331) are used for calculating the χ/Q values of MCR, together with the meteorological condition based on RG 1.194 (e.g., F stability with wind speeds of 1.0 m/s) and multiplier. According to the setting method of these χ/Q values, the closer the distance the more conservative it becomes. It is not used the ARCON96 directly in DCD.

- For each sources, the χ/Q values for inleakage and intake are set as those of the path with the shortest straight distances, respectively.

(7) Class 1E electrical room HVAC intake (south - east) and MCR HVAC Intake (east) are same intake duct (i.e. they are same location).

(8) Class 1E electrical room HVAC intake (south - west) and MCR HVAC Intake (west) are same intake duct (i.e. they are same location).

.3.4-50

○ SOURCES

- 1. Containment Shell to Class 1E electrical room HVAC intake (As Diffuse Area Source)
- 2. Containment Shell to Control Room HVAC Intake and Class 1E electrical room HVAC Intake (As Diffuse Area Source)
- 3. Containment Shell to Auxiliary Building HVAC Intake and technical support center HVAC Intake (As Diffuse Area Source)
- 4. Containment Shell to Reactor Building Door (As Diffuse Area Source)
- 5. Main Steam Line (Source points are in the west and the east.)
- 6. Relief Valve (Source points are in the west and the east.)
- 7. Safety Valve (Source points are in the west and the east.)
- 8. Fuel Handling Area





Impact on DCD

The DCD will be changed in Revision 2 to incorporate the following:

- Revise DCD Tier 2 Figure 15A-1 to indicate plant north and add the technical support center (TSC) intake and inleakage locations as indicated in Figure 02.03.04-1 in the answer of this RAI..
- Table 2.1-1 in DCD Tier 1 and Table 2.0-1 and Table 15A-18 through 15A-23 in the DCD Tier 2 should be revised as Table 02.03.04-1 in the answer of this RAI.

Impact on COLA

The FSAR will be changed in Revision 1 to incorporate the following:

• The Chapter 2 in FSAR will be revised

Impact on PRA

There is no impact on the PRA.

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION

6/4/2009 US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021 RAI NO.: NO.42-772 REVISION 0 SRP SECTION: 02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases APPLICATION SECTION: DCD Tier 2 Appendix 15A DATE OF RAI ISSUE: 7/30/2008

QUESTION NO. : 02.03.04-2

Add a table of ARCON96 source/receptor inputs to the DCD for use by all future COL applicants. The table should identify ARCON96 inputs for each main control room (MCR) and technical support center (TSC) source/receptor combination developed in accordance with the guidance provided in RG 1.194 (e.g., release height above plant grade, intake height above plant grade, horizontal distance between the release point and intake, direction from the intake to source in degrees from plant north, vent vertical velocity, stack flow, stack radius, building area, diffuse source initial lateral and vertical diffusion coefficients).

Review Procedure 6.b of SRP 2.3.4 states the DC application should contain figures and tables showing the design features that would be used by COL applicants to generate MCR χ /Q values. RG 1.194 presents criteria for characterizing atmospheric dispersion conditions for evaluating the consequences of radiological releases to the MCR. RG 1.194 endorses the ARCON96 atmospheric dispersion computer code (Revision 1 to NUREG-6331) as an acceptable methodology for determining MCR χ /Q values for use in design basis accident radiological analyses. The ARCON96 source/receptor inputs required to generate TSC χ /Q values should be added to this table as well.

ANSWER:

MHI will add the following sentences and tables in the Section 2.3 of the DCD Chapter 2.

The necessary data for COL applicant to calculate χ/Q values of MCR and TSC by using ARCON96 are shown as Tables 02.03.04-2-1, 02.03.04-2-2 and 02.03.04-2-3. The combinations of sources and receptors for each accident, which is also used to the calculation of χ/Q values of MCR and TSC by using ARCON96 for COL applicant, are listed Table 02.03.04-1-1 as the answer of RAI 02.03.04-1.

	Table 02.03.04-2-1 Common in	put parameters for x/Q	calculation of MCR and TSC
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Common parameter for ARCON96	
Building area (m ²)	2000 (1)
Plant vent vertical velocity (m/s)	NA ⁽²⁾
Stack flow (m ³ /s)	0 (3)
Stack radius (m)	0 (4)
Elevation difference (m)	0

NOTES:

(1) According to the RG 1.194, the default value (2000 m²) is used to reasonably calculate.

(2) The plant vent vertical velocity is not used due to ground release.

(3) The stack flow is conservatively set to zero. (See the RG 1.194.)

(4) The stack radius is set to zero according to the RG 1.194 due to zero stack flow.

Source	Height ⁽¹⁾ (m)
Containment	49.4
Plant vent	69.8
Main steam line (East)	12.8
Main steam line (West)	26.2
Main steam relief valve	40.5
Main steam safety valve	38.7
Fuel handling area	5.8

Table 02.03.04-2-2 Source heights

NOTE:

(1) The distance is from the ground level.

Table 02.03.04-2-3	Receptor heights
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Receptors	The height to the lower limit ⁽¹⁾ (m)	The height to the upper limit ⁽¹⁾ (m)
Control room HVAC intake (east and west)	14.3 ⁽²⁾	17.1 ⁽³⁾
Class 1E electrical room HVAC intake (south- east and south-west)	14.3 ⁽²⁾	17.1 ⁽³⁾
Class 1E electrical room HVAC intake (north- east and north-west)	14.3 ⁽²⁾	16.2 ⁽³⁾
Reactor building door	7.3 ⁽⁴⁾	9.8 ⁽⁵⁾
Auxiliary building and technical support center HVAC intake (north and south)	23.2 ⁽²⁾	27.1 ⁽³⁾

NOTES:

(1) The distance is from the ground level. The receptors are assumed as rectangular, and then the closer corner of receptor height is used to derive the vertical distance between sources and receptors.

(2) For release from main steam line (east) and fuel handling area.

(3) For release from containment, plant vent, main steam line (west), main steam relief valve and

main steam safety valve.

- (4) For release from fuel handling area.
- (5) For release from containment, plant vent, main steam line (east and west), main steam relief valve and main steam safety valve.

Impact on DCD

The DCD will be changed to incorporate the following:

 Table 02.03.04-2-1, 02.03.04-2-2 and 02.03.04-2-3 are added at the end of Section 2.3 in DCD.

Impact on COLA

The FSAR will be changed in Revision 1 to incorporate the following: • The Chapter 2 in FSAR will be revised

Impact on PRA

There is no impact on the PRA.

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6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:	NO.42-772 REVISION 0
SRP SECTION:	02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases
APPLICATION SECTION:	DCD Tier 2 Appendix 15A
DATE OF RAI ISSUE:	7/30/2008

QUESTION NO. : 02.03.04-3

Justify the main control room (MCR) intake and inleakage locations selected for each postulated accident and anticipated operational occurrence listed in DCD Tier 2 Tables 15A-18 through 15A-23. In particular, address the following:

(a) Why isn't the MCR HVAC intake listed as a receptor for the steam system piping failure, reactor cooling pump rotor seizure, rod ejection, and steam generator tube rupture postulated accidents?

(b) Why is the auxiliary building HVAC intake listed as an inleakage location for the rod ejection accident plant vent release pathway whereas the reactor building door is listed as an inleakage location for the loss-of-coolant accident plant vent release pathway?

(c) Why is the auxiliary building HVAC intake listed as an inleakage location for the rod ejection accident ground level containment release pathway whereas the class 1E electrical room HVAC intake is listed as the loss-of-coolant accident ground level containment release pathway?

ANSWER:

(a) In principle, the MCR HVAC intake is selected as an intake location, while an inleakage location is selected from among the reactor building (R/B) door (communicating with the pathway in front of MCR), class 1E electrical room HVAC intake (external air drawn in by the class 1E electrical room HVAC may leak through negative pressure sections of the MCR HVAC equipment), and auxiliary building (A/B) HVAC intake (external air drawn in by the A/B HVAC is fed to the pathway in front of MCR) such that the direct distance from a release point will be shortest.

When the χ/Q value from inleakage is smaller than that of the intake, the χ/Q value for inleakage is set equal to the χ/Q of the intake. On the other hand, if the χ/Q value from inleakage is larger than that of the intake, but the difference is 10% or less, the χ/Q value for

intake is set equal to that of the inleakage (RADTRAD Ver.3.03 allows only one set of χ/Q values to be used in one calculation. These assumptions allow a reduced number of calculations). Thus, inleakage and intake dispersion from the main steam safety valve become identical. Intakes for the steam system piping failure, reactor coolant pump rotor seizure accident, rod ejection accident and steam generator tube rupture have χ/Q values different from those for the MCR HVAC. The intake location from the steam line at the time of steam system piping failure is the MCR HVAC intake and the distance from a rupture location is the same as the case of class 1E electrical room HVAC intake (Refer to answer to 02.03.04-2). This is the reason why χ/Q values are identical. In case of DCD Revision 0, focusing on the difference from inleakage (the difference was 10% or less), the class 1E electrical room HVAC intake was listed as the representative receptor. However, in DCD Revision 1 both the HVAC intake and the inleakage location are represented by MCR HVAC intake because of the same χ/Q values.

As regards the plant vent release pathway and ground level containment release pathway, the A/B HVAC intake is used because it has a shorter straight distance from the rupture location when compared to both the R/B door and class 1E electrical room HVAC intake. In the case of an accident when emergency core cooling system (ECCS) actuation signal is not issued, A/B HVAC continues its actuation. In the case of a LOCA when ECCS actuation signal is generated, the A/B HVAC stops. In case of rod ejection accident, it is anticipated that it takes considerable time before the ECCS actuation signal is emitted and the A/B HVAC is conservatively assumed to continue its actuation. Therefore the LOCA and rod ejection accident have different assumed inleakage positions.

In addition the DCD Tier 2 Tables 15A-18 through 15A-23 should be revised for COL applicant to calculate χ/Q values, because the COL applicant should be consider not only the distance from sources to receptors but also the wind directional frequency for calculation of χ/Q values by using ARCON96.

- (b) This answer is included in the above answer (a).
- (c) This answer is included in the above answer (a).

Impact on DCD

Table 15A-18 through 15A-23 in the DCD Tier 2 should be revised as Table 02.03.04-1 as the answer of RAI 02.03.04-1.

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

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6/4/2009

US-APWR Design Certification Mitsubishi Heavy Industries Docket No. 52-021

RAI NO.:	NO.42-772 REVISION 0
SRP SECTION:	02.03.04 - Short Term Atmospheric Dispersion Estimates for Accident Releases
APPLICATION SECTION:	DCD Tier 2 Appendix 15A
DATE OF RAI ISSUE:	7/30/2008

QUESTION NO. : 02.03.04-4

Revise the DCD to discuss in greater detail the methodology (e.g., atmospheric dispersion models, input assumptions, and meteorological data sets) used to select the exclusion area boundary (EAB), low population zone (LPZ), and main control room (MCR) atmospheric dispersion factors presented as key site parameters in DCD Tier 1 Table 2.1-1 and Tier 2 Table 2.0-1. Discuss how this methodology ensures that the selected key site parameter values bound a reasonable number of sites that have been or may be considered for a COL application.

Review Procedure 6.b of SRP 2.3.4 states site parameters should be representative of a reasonable number of sites that may be considered within a COL application and a basis should be provided for each of the site parameters.

ANSWER:

It is agreed to discuss the methodology, bounding of a reasonable number of sites in more detailed, and the basis for each of the site parameters.

Impact on DCD

The DCD will be changed in Revision 2 to incorporate the following:

Replace the second paragraph of Subsection 2.3.4 with the following:

"The short-term χ/Q values are site-specific parameters. The χ/Q values listed in Table 2.0-1 are bounding factors for a typical US-APWR sited in most areas of the US and can be used to calculate radiological consequences of design basis accidents. There is no site specific meteorological data in the stage of the DCD. The atmospheric dispersion factors (χ/Q values) are determined as follows. The US-APWR χ/Q value of EAB should be determined as the representative of the US plants. Therefore, the US-APWR χ/Q value of EAB is selected to envelop most values at the corresponding EAB distance (0.5 miles) of the many existing plants. This value is reasonable in comparison with the existing plants values with different EAB distances.

The χ/Q values of LPZ are also determined by using the same method as EAB at every time interval. However, the LPZ distance of US-APWR can not be specified in the stage of the DCD. Therefore, the US-APWR χ/Q values of LPZ are determined to envelop most χ/Q values of many existing plants with LPZ distance of more than 1 mile.

The 0-8 hrs χ/Q values of MCR are calculated by some formula based on both the diffusion equations used in ARCON96 (e.g. Revision 1 to NUREG-6331) and the meteorological condition referred to RG 1.194 (e.g. F stability and wind speeds of 1.0 m/s), not directly by ARCON96 itself. In this calculation formula, a multiplier is introduced to envelop the most χ/Q values of MCR of many existing plants. It is not used the ARCON96 directly in DCD.

By using the χ/Q values of MCR at various source-receptor distances of many existing plants, it is ensured that the above calculation formula envelops the most χ/Q values of the existing plants at any source-receptor distance, and then the US-APWR χ/Q values of MCR are determined by this calculation formula.

The other time interval χ/Q values (8-24 hrs, 24-96 hrs, 96-720 hrs) of MCR are calculated by using both the above formula of 0-8 hrs χ/Q values and the time interval factors described in RG 1.194 regulatory position 4.4. These calculated χ/Q values also envelop most existing plants values.

As a result, the US-APWR χ/Q values of EAB, LPZ and MCR in DCD Tier 2 Table 2.0-1 are representative of a reasonable number of the existing plants values. The COL Applicant is to provide conservative factors as described in SRP 2.3.4 (Reference 2.3-2). If a selected site will cause excess to the bounding χ/Q values, then the COL Applicant is to demonstrate how the dose reference values in 10 CFR 52.79(a)(1)(vi) (Reference 2.3-3) and the control room dose limits in 10 CFR 50, Appendix A, General Design Criteria 19 (Reference 2.3-4) are met using site-specific χ/Q values."

Impact on COLA

There is no impact on the COLA.

Impact on PRA

There is no impact on the PRA.

This completes MHI's responses to the NRC's questions.