

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09- HDPC	2-2	This sequence represents a thermal challenge to an HDPC in an HTC during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00
ISO-ESD09- HDPC	2-3	This sequence represents a thermal challenge to an HDPC in an HTC during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09- HDPC	2-4	This sequence represents a thermal challenge to an HDPC in an HTC during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06
ISO-ESD09- HDPC	3-2	This sequence represents a thermal challenge to an HDPC in an HTC during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-04	8.E-05	1.E-03

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09- HDPC	3-3	This sequence represents a thermal challenge to an HDPC in an HTC during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09- HDPC	3-4	This sequence represents a thermal challenge to an HDPC in an HTC during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	6.E-10	2.E-10	2.E-09
ISO-ESD09- HDPC	4-2	This sequence represents a thermal challenge to an HDPC in an HTC/HSTC during movement between a handling facility and the Aging Facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_AF_Movement, /FIRE_CANISTER_AO, FIRE_SHIELD_AO	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD09- HDPC	4-3	This sequence represents a thermal challenge to an HDPC in an HTC/HSTC during movement between a handling facility and the Aging Facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_AF_Movement, FIRE_CANISTER_AO, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09- HDPC	4-4	This sequence represents a thermal challenge to an HDPC in an HTC/HSTC during movement between a handling facility and the Aging Facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_AF_Movement, FIRE_CANISTER_AO, FIRE_MODERATOR	RUC	6.E-10	2.E-10	2.E-09
ISO-ESD09- HDPC	5-2	This sequence represents a thermal challenge to an HDPC in a HAM during aging in the Aging Facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_AF_Aging, /FIRE_CANISTER_AO, FIRE_SHIELD_AO	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD09- HDPC	5-3	This sequence represents a thermal challenge to an HDPC in a HAM during aging in the Aging Facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_AF_Aging, FIRE_CANISTER_AO, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09- HDPC	5-4	This sequence represents a thermal challenge to an HDPC in a HAM during aging in the Aging Facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_AF_Aging, FIRE_CANISTER_AO, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se-quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-HLW	2-2	This sequence represents a thermal challenge to HLW in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00
ISO-ESD09-HLW	2-3	This sequence represents a thermal challenge to HLW in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, /FIRE_MODERATOR_NA	RRU	6.E-07	2.E-07	2.E-06
ISO-ESD09-HLW	2-4	This sequence represents a thermal challenge to HLW in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, FIRE_MODERATOR_NA	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD09-HLW	3-2	This sequence represents a thermal challenge to HLW in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	2.E-03	5.E-04	8.E-03

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-HLW	3-3	This sequence represents a thermal challenge to HLW in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, /FIRE_MODERATOR_NA	RRU	4.E-09	1.E-09	2.E-08
ISO-ESD09-HLW	3-4	This sequence represents a thermal challenge to HLW in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, FIRE_MODERATOR_NA	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD09-HLW	4-2	N/A - HLW is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-HLW	4-3	N/A - HLW is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-HLW	4-4	N/A - HLW is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-HLW	5-2	N/A - HLW is not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-HLW	5-3	N/A - HLW is not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-HLW	5-4	N/A - HLW is not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	2-2	This sequence represents a thermal challenge to a naval canister in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC_NAV, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se-quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-NAV	2-3	This sequence represents a thermal challenge to a naval canister in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC_NAV, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-NAV	2-4	This sequence represents a thermal challenge to a naval canister in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC_NAV, FIRE_MODERATOR	RUC	3.E-07	8.E-08	1.E-06
ISO-ESD09-NAV	3-2	This sequence represents a thermal challenge to a naval canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC_NAV, FIRE_SHIELD_TCASK	DEL	4.E-04	9.E-05	1.E-03
ISO-ESD09-NAV	3-3	This sequence represents a thermal challenge to a naval canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC_NAV, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se-quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-NAV	3-4	This sequence represents a thermal challenge to a naval canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC_NAV, FIRE_MODERATOR	RUC	4.E-10	9.E-11	1.E-09
ISO-ESD09-NAV	4-2	N/A - a naval canisters are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	4-3	N/A - a naval canisters are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	4-4	N/A - a naval canisters are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	5-2	N/A - a naval canisters are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	5-3	N/A - a naval canisters are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-NAV	5-4	N/A - a naval canisters are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	2-2	This sequence represents a thermal challenge to an MCO in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00
ISO-ESD09-MCO	2-3	This sequence represents a thermal challenge to an MCO in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00

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Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se-quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-MCO	2-4	This sequence represents a thermal challenge to an MCO in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06
ISO-ESD09-MCO	3-2	This sequence represents a thermal challenge to an MCO in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	1.E-04	3.E-05	4.E-04
ISO-ESD09-MCO	3-3	This sequence represents a thermal challenge to an MCO in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-MCO	3-4	This sequence represents a thermal challenge to an MCO in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	2.E-10	5.E-11	8.E-10

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-MCO	4-2	N/A - MCOs are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	4-3	N/A - MCOs are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	4-4	N/A - MCOs are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	5-2	N/A - MCOs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	5-3	N/A - MCOs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-MCO	5-4	N/A - MCOs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-DSTD	2-2	This sequence represents a thermal challenge to a DSTD in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00
ISO-ESD09-DSTD	2-3	This sequence represents a thermal challenge to a DSTD in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-DSTD	2-4	This sequence represents a thermal challenge to a DSTD in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-DSTD	3-2	This sequence represents a thermal challenge to a DSTD in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-04	9.E-05	1.E-03
ISO-ESD09-DSTD	3-3	This sequence represents a thermal challenge to a DSTD in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-DSTD	3-4	This sequence represents a thermal challenge to a DSTD in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	7.E-10	2.E-10	3.E-09
ISO-ESD09-DSTD	4-2	N/A - DSTDs are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-DSTD	4-3	N/A - DSTDs are not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-DSTD	4-4	N/A - DSTDs are not transferred to the Aging Facility	—	N/A	—	—	—

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Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-DSTD	5-2	N/A - DSTDs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-DSTD	5-3	N/A - DSTDs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-DSTD	5-4	N/A - DSTDs are not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09-TAD	2-2	This sequence represents a thermal challenge to a TAD canister in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	3.E-01	8.E-02	1.E+00
ISO-ESD09-TAD	2-3	This sequence represents a thermal challenge to a TAD canister in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-TAD	2-4	This sequence represents a thermal challenge to a TAD canister in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-TAD	3-2	This sequence represents a thermal challenge to a TAD canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_CANISTER_TC, FIRE_SHIELD_TCASK	DEL	7.E-03	2.E-03	3.E-02
ISO-ESD09-TAD	3-3	This sequence represents a thermal challenge to a TAD canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-TAD	3-4	This sequence represents a thermal challenge to a TAD canister in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_CANISTER_TC, FIRE_MODERATOR	RUC	1.E-08	4.E-09	6.E-08
ISO-ESD09-TAD	4-2	This sequence represents a thermal challenge to a TAD canister in an aging overpack during movement between a handling facility and the Aging Facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_AF_Movement, /FIRE_CANISTER_AO, FIRE_SHIELD_AO	DEL	0.E+00	0.E+00	0.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-TAD	4-3	This sequence represents a thermal challenge to a TAD canister in an aging overpack during movement between a handling facility and the Aging Facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_AF_Movement, FIRE_CANISTER_AO, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00
ISO-ESD09-TAD	4-4	This sequence represents a thermal challenge to a TAD canister in an aging overpack during movement between a handling facility and the Aging Facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_AF_Movement, FIRE_CANISTER_AO, FIRE_MODERATOR	RUC	1.E-08	4.E-09	6.E-08
ISO-ESD09-TAD	5-2	This sequence represents a thermal challenge to a TAD canister in an aging overpack during aging in the Aging Facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_AF_Aging, /FIRE_CANISTER_AO, FIRE_SHIELD_AO	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD09-TAD	5-3	This sequence represents a thermal challenge to a TAD canister in an aging overpack during aging in the Aging Facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_AF_Aging, FIRE_CANISTER_AO, /FIRE_MODERATOR	RRU	0.E+00	0.E+00	0.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-TAD	5-4	This sequence represents a thermal challenge to a TAD canister in an aging overpack during aging in the Aging Facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_AF_Aging, FIRE_CANISTER_AO, FIRE_MODERATOR	RUC	6.E-07	2.E-07	2.E-06
ISO-ESD09-UCSNF	2-2	This sequence represents a thermal challenge to UCSNF in a transportation cask during staging in the buffer area, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Buffer, /FIRE_TCASK_UCSNF, FIRE_SHIELD_TCASK	DEL	3.E-01	7.E-02	1.E+00
ISO-ESD09-UCSNF	2-3	This sequence represents a thermal challenge to UCSNF in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_TCASK_UCSNF, /FIRE_MODERATOR_NA	RRU	2.E-02	4.E-03	6.E-02
ISO-ESD09-UCSNF	2-4	This sequence represents a thermal challenge to UCSNF in a transportation cask during staging in the buffer area, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Buffer, FIRE_TCASK_UCSNF, FIRE_MODERATOR_NA	RUC	0.E+00	0.E+00	0.E+00

Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09-UCSNF	3-2	This sequence represents a thermal challenge to UCSNF in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in a direct exposure from loss of shielding due to fire. In this sequence the canister remains intact, but the shielding fails.	ISO_ESD09_Fires_TC_Movement, /FIRE_TCASK_UCSNF, FIRE_SHIELD_TCASK	DEL	3.E-03	8.E-04	1.E-02
ISO-ESD09-UCSNF	3-3	This sequence represents a thermal challenge to UCSNF in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release from canister breach due to fire. In this sequence the canister fails, but moderator is prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_TCASK_UCSNF, /FIRE_MODERATOR_NA	RRU	2.E-04	4.E-05	6.E-04
ISO-ESD09-UCSNF	3-4	This sequence represents a thermal challenge to UCSNF in a transportation cask during movement between the GROA boundary and a buffer area or a handling facility, resulting in an unfiltered radiological release important to criticality from canister breach due to fire. In this sequence the canister fails, and moderator is not prevented from entering the canister.	ISO_ESD09_Fires_TC_Movement, FIRE_TCASK_UCSNF, FIRE_MODERATOR_NA	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD09-UCSNF	4-2	N/A - UCSNF is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-UCSNF	4-3	N/A - UCSNF is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-UCSNF	4-4	N/A - UCSNF is not transferred to the Aging Facility	—	N/A	—	—	—
ISO-ESD09-UCSNF	5-2	N/A - UCSNF is not handled in the Aging Facility	—	N/A	—	—	—

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Table G-1. Event Sequence Quantification (Continued)

Event Tree	Se- quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD09- UCSNF	5-3	N/A - UCSNF is not handled in the Aging Facility	—	N/A	—	—	—
ISO-ESD09- UCSNF	5-4	N/A - UCSNF is not handled in the Aging Facility	—	N/A	—	—	—

NOTE: Calc'd = calculated; CSNF = commercial spent nuclear fuel; DAW = dry active waste; DPC = dual-purpose canister; DSTD = U.S. Department of Energy standardized canister; GROA = geologic repository operations area; HAM = horizontal aging module; HDPC = horizontal dual-purpose canister; HEPA = high-efficiency particulate air (filter); HLW = high-level radioactive waste; HSTC = horizontal shielded transfer cask; HTC = a transportation cask that is never upended; ITS = important to safety; LLW = low-level radioactive waste; LLWF = Low-Level Waste Facility; MCO = multicanister overpack; Std. = standard; TAD = transportation, aging, and disposal; TT = truck trailer; UCSNF = uncanistered commercial spent nuclear fuel; WHF = Wet Handling Facility.

Source: Original

Table G-2. Final Event Sequences Summary

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-DPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-HDPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-HLW-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	5 HLW canisters	2.E-05	9.E-06	5.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO01-HLW-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HLW-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	5 HLW canisters	2.E-06	2.E-06	3.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HLW-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-NAV-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 naval SNF canister	3.E-07	3.E-07	6E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 naval SNF canister	3.E-07	3.E-07	6.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-MCO-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	4 MCOs	5.E-06	2.E-06	1.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	4 MCOs	1.E-07	1.E-07	2.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-DSTD-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	9 DOE standardized canisters	2.E-05	6.E-06	4.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO01-DSTD-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	3.E-07	3.E-07	7.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-TAD-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 TAD canister	6.E-06	6.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	6.E-06	6.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-UCSNF-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 transportation cask with uncanistered SNF assemblies	2.E-04	6.E-05	4.E-04	Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence where a transportation cask breaches but the canister inside remains intact is not applicable to transportation casks with uncanistered SNF assemblies.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, and a moderator is excluded from entering the cask.	1 transportation cask with uncanistered SNF assemblies	2.E-06	2.E-06	5.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO02-DPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-05	2.E-05	7.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO02-DPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	3.E-08	2.E-08	7.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-DPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-TAD-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 TAD canister	8.E-04	4.E-04	2.E-03	Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO02-TAD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	8.E-07	4.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-TAD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO03-HDPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in a direct exposure from degradation of shielding. In this sequence, the cask containment function remains intact, and the shielding fails.	1 DPC	2.E-05	3.E-06	1.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO03-HDPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO03-HDPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	2.E-05	3.E-06	1.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO03-HDPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO04-HDPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-05	1.E-05	5.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO04-HDPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	7.E-06	3.E-06	1.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO04-HDPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO05-DAW-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a container with a HEPA filter from the WHF, during processing operations at the LLW Facility, resulting in an unfiltered radionuclide release. In this sequence, the container fails.	1 container with HEPA filter from the WHF	6.E-02	2.E-02	2.E-01	Category 2	Mean of distribution for number of occurrences of event sequence
ISO05-WETnr-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a container with wet-solid waste (pool filter) from the WHF, during processing operations at the LLW Facility, resulting in an unfiltered radionuclide release. In this sequence, the container fails.	1 container with pool filter from the WHF	5.E-03	2.E-03	1.E-02	Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO05-LIQ-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to liquid LLW processing equipment, during processing operations at the LLW Facility, resulting in an unfiltered radionuclide release. This sequence is considered to be part of off-normal events.	Liquid LLW	—	—	—	—	Liquid LLW release is classified as an off-normal event, since the consequences to a worker are a small fraction of the performance objectives (<i>Preclosure Consequence Analyses</i> , (Ref. 2.2.30, Appendix IV)).
ISO06-LLW-SEQ2-RRU	Unfiltered radionuclide release	Collapse of the LLWF due to a seismic event is analyzed for consequence in <i>Preclosure Consequence Analyses</i> (Ref. 2.2.30, Table 2, Section 6.3.4, and Section 6.8.1), and is bounding. No further analysis for collapse of the LLWF is needed.	All LLW inventory of LLW Facility	—	—	—	—	Addressed in <i>External Events Hazard Screening Analysis</i> (Ref. 2.2.26) and <i>Seismic Event Sequence Quantification and Categorization</i> (Ref. 2.4.4).
ISO07-LLW-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to the inventory of LLW present in the LLW Facility, due to a fire at that facility, resulting in an unfiltered radionuclide release. In this sequence, the combustible LLW forms present in the facility burn.	inventory of LLW at the LLW Facility	7.E-02	6.E-02	3.E-02	Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO08-DAW-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a container with a HEPA filter from the WHF, during transfer to the LLW Facility, resulting in an unfiltered radionuclide release. In this sequence, the container fails.	1 container with HEPA filter from the WHF	2.E-03	6.E-04	5.E-03	Category 2	Mean of distribution for number of occurrences of event sequence
ISO08-WETr-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a container with wet-solid resin from the WHF, during transfer to the LLW Facility, resulting in an unfiltered radionuclide release. In this sequence, the container fails.	1 container with wet-solid resin from the WHF	2.E-04	5.E-05	5.E-04	Category 2	Mean of distribution for number of occurrences of event sequence
ISO08-WETnr-SEQ2-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a container with wet-solid waste (pool filter) from the WHF, during transfer to the LLW Facility, resulting in an unfiltered radionuclide release. In this sequence, the container fails.	1 container with pool filter from the WHF	2.E-03	7.E-04	3.E-03	Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-DPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-DPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HDPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-HDPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HDPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-HLW-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	5 HLW canisters	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-HLW-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	5 HLW canisters	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HLW-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-NAV-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 naval SNF canister	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-NAV-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-NAV-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 naval SNF canister	3.E-07	8.E-08	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-MCO-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	4 MCOs	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-MCO-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-MCO-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	4 MCOs	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DSTD-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	9 DOE standardized canisters	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-DSTD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DSTD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-TAD-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 TAD canister	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO09-TAD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-TAD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-UCSNF-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a transportation cask with uncanistered SNF assemblies, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 transportation cask with uncanistered SNF assemblies	3.E-01	8.E-02	1.E+00	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution

Table G-2. Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-UCSNF-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a transportation cask with uncanistered SNF assemblies, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, and a moderator is excluded from entering the cask.	1 transportation cask with uncanistered SNF assemblies	2.E-02	4.E-03	6.E-02	Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-UCSNF-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a transportation cask with uncanistered SNF assemblies, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

NOTE: ^a The expected number of occurrences, over the preclosure period, of event sequences involving MCOs may not lead to an acceptable categorization with regard to 10 CFR 63.111 (Ref. 2.3.2) performance objectives. Therefore, further investigation of these event sequences may be needed. As a consequence, the categorization of event sequences involving MCOs is considered to be preliminary.
^b The material at risk is, as relevant, based upon the nominal capacity of the waste form container involved in the event sequence under consideration, or accounts for the specific operation covered by the event sequence.
^c The mean, median, and standard deviation displayed are for the number of occurrences, over the preclosure period, of the event sequence under consideration.
 DOE = U.S. Department of Energy; DPC = dual-purpose canister; HLW = high-level radioactive waste; LLW = Low level waste; MCO = multicanister overpack; TAD = transportation, aging, and disposal; WHF = Wet Handling Facility.

Source: Original

Table G-3. Beyond Category 2 Final Event Sequences Summary

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO02-DPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-05	2.E-05	7.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO04-HDPC-SEQ2-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the canister remains intact, and the shielding fails.	1 DPC	3.E-05	1.E-05	5.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO01-HLW-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	5 HLW canisters	2.E-05	9.E-06	5.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution

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Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO03-HDPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	2.E-05	3.E-06	1.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO03-HDPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in a direct exposure from degradation of shielding. In this sequence, the cask containment function remains intact, and the shielding fails.	1 DPC	2.E-05	3.E-06	1.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ISO01-DSTD-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	9 DOE standardized canisters	2.E-05	6.E-06	4.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO04-HDPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	7.E-06	3.E-06	1.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	4 MCOs	5.E-06	2.E-06	1.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	6.E-06	6.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 TAD canister	6.E-06	6.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-UCSNF-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, and a moderator is excluded from entering the cask.	1 transportation cask with uncanistered SNF assemblies	2.E-06	2.E-06	5.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-TAD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HDPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-HLW-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	5 HLW canisters	2.E-06	2.E-06	3.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-TAD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	8.E-07	4.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HLW-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	5 HLW canisters	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DSTD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-MCO-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	4 MCOs	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-NAV-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 naval SNF canister	3.E-07	8.E-08	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	3.E-07	3.E-07	7.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 naval SNF canister	3.E-07	3.E-07	6.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-NAV-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 naval SNF canister	3.E-07	3.E-07	6.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-HDPC-SEQ2-DED	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from degradation of shielding. In this sequence, the transportation cask containment function remains intact, and the shielding fails.	1 DPC	3.E-07	3.E-07	5.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ4-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release. In this sequence, the transportation cask fails, the canister fails, and a moderator is excluded from entering the canister.	4 MCOs	1.E-07	1.E-07	2.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-DPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	2.E-08	3.E-08	7.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-DPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HLW-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-HLW-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-MCO-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-TAD-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in a direct exposure from loss of shielding. In this sequence, the transportation cask fails, and the canister remains intact.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO01-TAD-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence where a transportation cask breaches but the canister inside remains intact is not applicable to transportation casks with uncanistered SNF assemblies.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-DPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO02-TAD-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO03-HDPC-SEQ3-DEL	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in a direct exposure from loss of shielding. In this sequence, the cask fails, and the canister remains intact.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO03-HDPC-SEQ5-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO04-HDPC-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-DPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HDPC-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HLW-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-NAV-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-MCO-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DSTD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-TAD-SEQ3-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release. In this sequence, the canister fails, and a moderator is excluded from entering the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

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Table G-3. Beyond Category 2 Final Event Sequences Summary (Continued)

Event Sequence Group ID ^a	End State	Description	Material-At-Risk ^b	Mean ^c	Median ^c	Std Dev ^c	Event Seq. Cat.	Basis for Categorization
ISO09-UCSNF-SEQ4-RUC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a transportation cask with uncanistered SNF assemblies, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

NOTE: ^a The expected number of occurrences, over the preclosure period, of event sequences involving MCOs may not lead to an acceptable categorization with regard to 10 CFR 63.111 (Ref. 2.3.2) performance objectives. Therefore, further investigation of these event sequences may be needed. As a consequence, the categorization of event sequences involving MCOs is considered to be preliminary.

^b The material at risk is, as relevant, based upon the nominal capacity of the waste form container involved in the event sequence under consideration, or accounts for the specific operation covered by the event sequence.

^c The mean, median, and standard deviation displayed are for the number of occurrences, over the preclosure period, of the event sequence under consideration.

DOE = U.S. Department of Energy; DPC = dual-purpose canister; HLW = high-level radioactive waste; LLW = low-level radioactive waste; MCO = multicanister overpack;
TAD = transportation, aging, and disposal; WHF = Wet Handling Facility.

Source: Original

Table G-4. Important to Criticality Final Event Sequences Summary

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO09-TAD-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a TAD canister inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DPC-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a DPC inside a transportation cask or aging overpack, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HDPC-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a horizontal DPC inside a transportation cask, a horizontal aging module, or a horizontal STC, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	1.E-06	4.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-DSTD-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a DOE standardized canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

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Table G-4. Important to Criticality Final Event Sequences Summary (Continued)

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO09-MCO-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to an MCO inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	4 MCOs	6.E-07	2.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-NAV-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a naval SNF canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 naval SNF canister	3.E-07	8.E-08	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DPC-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-HDPC-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-4. Important to Criticality Final Event Sequences Summary (Continued)

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO01-HLW-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-NAV-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a naval SNF canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 naval SNF canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-MCO-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to an MCO inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	4 MCOs	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-DSTD-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	9 DOE standardized canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-4. Important to Criticality Final Event Sequences Summary (Continued)

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO01-TAD-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO01-UCSNF-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a transportation cask with uncanistered SNF assemblies, during intra-site movement, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-DPC-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO02-TAD-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 TAD canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-4. Important to Criticality Final Event Sequences Summary (Continued)

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO03-HDPC-SEQ5-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during transit to or from the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the cask fails, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO04-HDPC-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a structural challenge to a horizontal DPC inside a transportation cask or horizontal STC, during operations at a horizontal aging module in the Aging Facility, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	1 DPC	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ISO09-HLW-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to an HLW canister inside a transportation cask, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the canister fails, and a moderator enters the canister.	5 HLW canisters	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

Table G-4. Important to Criticality Final Event Sequences Summary (Continued)

Event Sequence Group ID	End State	Description	Material-At-Risk	Mean	Median	Std Dev	Event Seq. Cat.	Basis for Categorization
ISO09-UCSNF-SEQ4-RUC	Unfiltered Radionuclide Release, Important To Criticality	This event sequence represents a thermal challenge to a transportation cask with uncanistered SNF assemblies, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence, the transportation cask fails, and a moderator enters the cask.	1 transportation cask with uncanistered SNF assemblies	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

NOTE: Calc'd = calculated; CSNF = commercial spent nuclear fuel; DAW = dry active waste; DPC = dual-purpose canister; DSTD = U.S. Department of Energy standardized canister; GROA = geologic repository operations area; HAM = horizontal aging module; HDPC = horizontal dual-purpose canister; HEPA = high-efficiency particulate air (filter); HLW = high-level radioactive waste; HSTC = horizontal shielded transfer cask; HTC = a transportation cask that is never upended; ITS = important to safety; LLW = low-level radioactive waste; LLWF = Low-Level Waste Facility; MCO = multicanister overpack; Std. = standard; TAD = transportation, aging, and disposal (canister); TT = truck trailer; UCSNF = uncanistered commercial spent nuclear fuel; WHF = Wet Handling Facility.

Source: Original

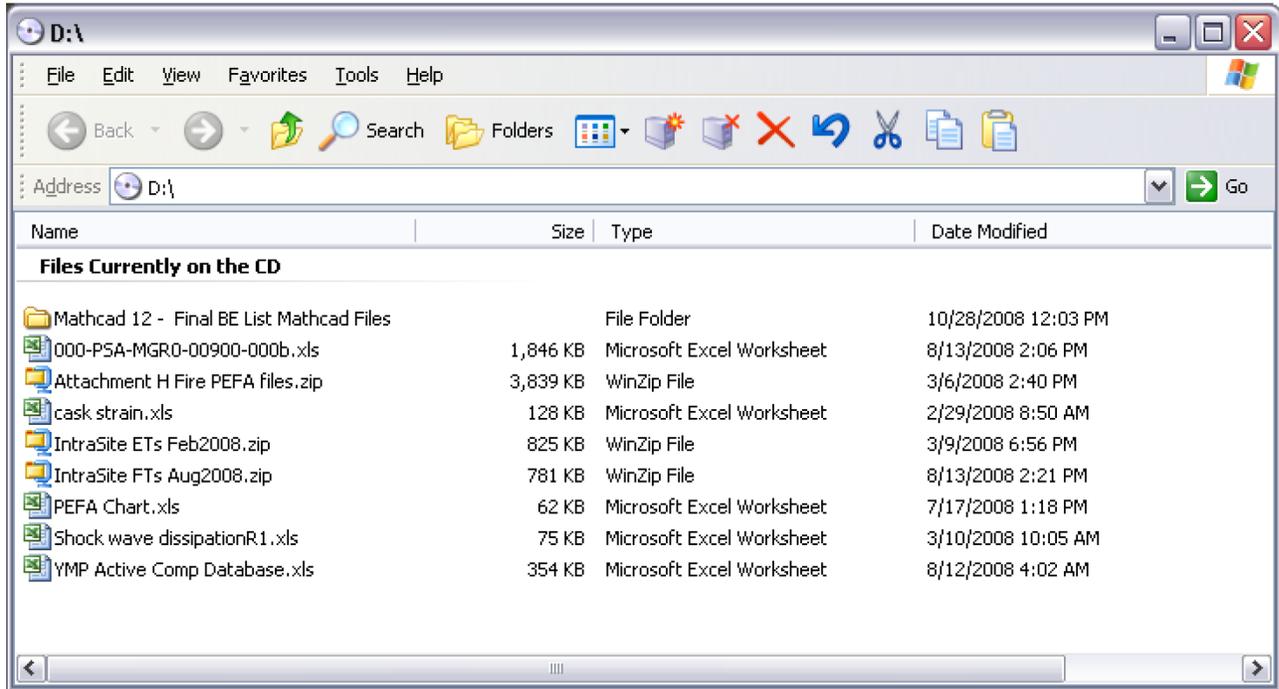
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ATTACHMENT H
SAPPHIRE MODEL AND SUPPORTING FILES

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ATTACHMENT H EXCEL SPREADSHEET, SAPHIRE MODEL, AND SUPPORTING FILES

This attachment is the CD containing the Excel Spreadsheet and SAPHIRE model and supporting files. The electronic files contained on the CD are identified below.



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