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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 Sequence. Cat.	Basis for Categorization
ESD20-MCO-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO, due to a fire, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	4 MCOs	7.E-08	2.E-08	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-MCO-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an MCO, due to a fire, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	4 MCOs	9.E-04	8.E-04	4.E-04	Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-MCO-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary fails, and a moderator enters the canister.	4 MCOs	8.E-07	3.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-TAD-SEQ2-DE	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a TAD 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 TAD canister	2.E-01	2.E-01	7.E-02	Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD20-TAD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	2.E-06	2.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

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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 Sequence. Cat.	Basis for Categorization
ESD20-TAD-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	1 TAD canister	2.E-09	8.E-10	6.E-09	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-TAD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	8.E-06	8.E-06	4.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-TAD-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary fails, and a moderator enters the canister.	1 TAD canister	8.E-09	3.E-09	2.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ2-DE	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence the canisters remain intact, and the shielding fails.	5 HLW canisters and 1 DOE standardized canister	0.E+00	0.E+00	0.E+00	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-06	1.E-06	5.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence

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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 Sequence. Cat.	Basis for Categorization
ESD20-WP-H&D-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary remains intact, and a moderator enters the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-09	5.E-10	3.E-09	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in an unfiltered radionuclide release. In this sequence a canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	5.E-07	4.E-07	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary fails, and a moderator enters the canister.	5 HLW canisters and 1 DOE standardized canister	5.E-10	2.E-10	1.E-09	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&M-SEQ2-DE	Direct exposure, loss of shielding	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in a direct exposure from loss of shielding. In this sequence the canisters remain intact, and the shielding fails.	2 HLW canisters and 2 MCOs	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-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 Sequence. Cat.	Basis for Categorization
ESD20-WP-H&M-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	2 HLW canisters and 2 MCOs	9.E-08	9.E-08	3.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&M-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary remains intact, and a moderator enters the canister.	2 HLW canisters and 2 MCOs	9.E-11	3.E-11	2.E-10	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&M-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in an unfiltered radionuclide release. In this sequence a canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	2 HLW canisters and 2 MCOs	3.E-08	3.E-08	1.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&M-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary fails, and a moderator enters the canister.	2 HLW canisters and 2 MCOs	3.E-11	1.E-11	8.E-11	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 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.

AO = aging overpack; CTM = canister transfer machine; CTT = cask transfer trolley; DOE = U.S. Department of Energy; DPC = dual-purpose canister; HLW = high-level radioactive waste; MCO = multicanister overpack; TAD = transportation, aging, and disposal; TC = transportation cask; TEV = transport and emplacement vehicle; WPTT = waste package transfer trolley.

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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 Sequence. Cat.	Basis for Categorization
ESD08-MCO-SEQ05-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an MCO, due to collision between two CTMs during canister transfer, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 MCO and another canister	7.E-05	2.E-05	3.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD09-DSTD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister, during canister transfer by a CTM, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 DOE standardized canister and 1 HLW canister	5.E-05	2.E-05	9.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD07-MCO-SEQ04-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, due to CTT collision with shield door, resulting in a filtered radionuclide release. In this sequence the cell door structure remains intact, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	4 MCOs	4.E-05	1.E-05	6.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD11-WP-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during waste package assembly and closure, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	2.E-05	2.E-05	1.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 Sequence. Cat.	Basis for Categorization
ESD20-HLW-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to an HLW canister, due to a fire, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters	2.E-05	2.E-05	1.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD12-DPC-SEQ02-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside an aging overpack, during aging overpack assembly and closure, resulting in a direct exposure from loss of shielding. In this sequence the canister remains intact, and the shielding fails.	1 DPC	2.E-05	7.E-06	6.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD03-TAD-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, 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	2.E-05	6.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
ESD03-TAD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	2.E-05	6.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 Sequence. Cat.	Basis for Categorization
ESD14-DPC-SEQ02-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside an aging overpack, during transfer from Cask Unloading Room to Cask Preparation Room, resulting in a direct exposure from loss of shielding. In this sequence the canister remains intact, and the shielding fails.	1 DPC	2.E-05	3.E-06	2.E-04	Beyond Category 2	Mean of distribution for number of occurrences of event sequence near a category threshold. Categorization confirmed by alternative distribution
ESD16-DPC-SEQ02-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a DPC inside an aging overpack, during export activities, resulting in a direct exposure from loss of shielding. In this sequence the canister remains intact, and the shielding fails.	1 DPC	1.E-05	3.E-06	7.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-TAD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during export activities, resulting in a filtered radionuclide release. In this sequence the waste package fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	1.E-05	1.E-05	6.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD11-WP-H&D-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during waste package assembly and closure, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-05	9.E-06	4.E-06	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 Sequence. Cat.	Basis for Categorization
ESD04-TAD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	1.E-05	4.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-TAD-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), 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	1.E-05	4.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD05-TAD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister, during aging overpack preparation activities, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	9.E-06	4.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-TAD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	8.E-06	8.E-06	4.E-06	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 Sequence. Cat.	Basis for Categorization
ESD10-WP-H&M-SEQ04-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a structural challenge to a combination of MCOs and HLW canisters inside a waste package, during WPTT transfer to the Waste Package Positioning Room, resulting in a filtered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary remains intact, and a moderator enters the canister.	2 HLW canisters and 2 MCOs	8.E-06	2.E-06	3.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD12-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during aging overpack assembly and closure, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	7.E-06	3.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-H&D-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during export activities, resulting in a filtered radionuclide release. In this sequence the waste package fails, a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	5.E-06	5.E-06	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD09-TAD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister, during canister transfer by a CTM, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	5.E-06	2.E-06	1.E-05	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 Sequence. Cat.	Basis for Categorization
ESD03-HLW-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, 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	4.E-06	2.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-HLW-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters	4.E-06	2.E-06	2.E-05	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-DSTD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a DOE standardized canister, due to a fire, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	3.E-06	3.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-HLW-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), 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	3.E-06	1.E-06	7.E-06	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 Sequence. Cat.	Basis for Categorization
ESD04-HLW-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters	3.E-06	1.E-06	7.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD09-DPC-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DPC, during canister transfer by a CTM, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 DPC	2.E-06	1.E-06	5.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-TAD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a TAD canister, due to a fire, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	2.E-06	2.E-06	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-DPC-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, 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	2.E-06	1.E-06	3.E-06	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 Sequence. Cat.	Basis for Categorization
ESD03-DPC-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DPC inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 DPC	2.E-06	1.E-06	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD09-DSTD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister, during canister transfer by a CTM, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 DOE standardized canister and 1 HLW canister	2.E-06	7.E-07	7.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD07-MCO-SEQ06-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, due to CTT collision with shield door, resulting in an unfiltered radionuclide release. In this sequence the cell door structure remains intact, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	4 MCOs	2.E-06	4.E-07	4.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-06	1.E-06	5.E-07	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 Sequence. Cat.	Basis for Categorization
ESD11-WP-TAD-SEQ05-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during waste package assembly and closure, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	1.E-06	7.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD06-MCO-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO inside a transportation cask, during CTT transfer to the Cask Unloading Room, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	4 MCOs	1.E-06	4.E-07	4.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-DSTD-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, 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	9.E-07	3.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-DSTD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	9.E-07	3.E-07	3.E-06	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 Sequence. Cat.	Basis for Categorization
ESD11-WP-H&M-SEQ04-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a structural challenge to a combination of MCOs and HLW canisters inside a waste package, during waste package assembly and closure, resulting in a filtered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary remains intact, and a moderator enters the canister.	2 HLW canisters and 2 MCOs	8.E-07	3.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-MCO-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO, due to a fire, resulting in an unfiltered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary fails, and a moderator enters the canister.	4 MCOs	8.E-07	3.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-DPC-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DPC inside a transportation cask, during preparation activities (unbolting, lid adapter installation), 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	7.E-07	3.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-DPC-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DPC inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 DPC	7.E-07	3.E-07	2.E-06	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 Sequence. Cat.	Basis for Categorization
ESD03-TAD-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in an unfiltered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	7.E-07	2.E-07	3.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD07-TAD-SEQ03-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask or aging overpack, due to CTT or site transporter collision with shield door, resulting in a direct exposure from loss of shielding. In this sequence the cell door structure remains intact, the canister remains intact, and the shielding fails.	1 TAD canister	6.E-07	7.E-08	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD02-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during receipt activities, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	6.E-07	4.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-TAD-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during export activities, resulting in an unfiltered radionuclide release. In this sequence the waste package fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	6.E-07	3.E-07	8.E-07	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 Sequence. Cat.	Basis for Categorization
ESD04-DSTD-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), 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	5.E-07	2.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-DSTD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DOE standardized canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	5.E-07	2.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&D-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a thermal challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, due to a fire, resulting in an unfiltered radionuclide release. In this sequence a canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	5.E-07	4.E-07	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD11-WP-H&D-SEQ05-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during waste package assembly and closure, resulting in an unfiltered radionuclide release. In this sequence a canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	5.E-07	3.E-07	6.E-07	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 Sequence. Cat.	Basis for Categorization
ESD06-TAD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask or aging overpack, during CTT or site transporter transfer to the Cask Unloading Room, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	4.E-07	3.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD12-DPC-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a DPC inside an aging overpack, during aging overpack assembly and closure, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 DPC	4.E-07	2.E-07	8.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-TAD-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in an unfiltered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	4.E-07	1.E-07	2.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD05-TAD-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister, during aging overpack preparation activities, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	4.E-07	1.E-07	1.E-06	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 Sequence. Cat.	Basis for Categorization
ESD01-TAD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during receipt activities, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	3.E-07	2.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-H&M-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a combination of MCOs and HLW canisters inside a waste package, during export activities, resulting in a filtered radionuclide release. In this sequence the waste package fails, a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	2 HLW canisters and 2 MCOs	3.E-07	3.E-07	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-H&M-SEQ3-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to a combination of MCOs and HLW canisters inside a waste package, during export activities, resulting in a direct exposure from loss of shielding. In this sequence the waste package fails, and the canisters remain intact.	2 HLW canisters and 2 MCOs	3.E-07	3.E-07	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD14-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during transfer from Cask Unloading Room to Cask Preparation Room, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	3.E-07	2.E-07	1.E-06	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 Sequence. Cat.	Basis for Categorization
ESD16-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during export activities, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	3.E-07	2.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD01-TAD-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to a TAD canister inside a transportation cask, during receipt activities, 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	3.E-07	2.E-07	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-MCO-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, 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	3.E-07	9.E-08	9.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-MCO-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	4 MCOs	3.E-07	9.E-08	9.E-07	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 Sequence. Cat.	Basis for Categorization
ESD13-WP-TAD-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during WPTT transfer to docking station, resulting in a filtered radionuclide release. In this sequence the waste package fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	3.E-07	2.E-07	3.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD12-TAD-SEQ05-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside an aging overpack, during aging overpack assembly and closure, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 TAD canister	3.E-07	9.E-08	9.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD10-WP-H&M-SEQ06-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to a combination of MCOs and HLW canisters inside a waste package, during WPTT transfer to the Waste Package Positioning Room, resulting in an unfiltered radionuclide release also important to criticality. In this sequence a canister fails, the confinement boundary fails, and a moderator enters the canister.	2 HLW canisters and 2 MCOs	3.E-07	7.E-08	1.E-06	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD10-WP-TAD-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a TAD canister inside a waste package, during WPTT transfer to the Waste Package Positioning Room, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	1 TAD canister	2.E-07	2.E-07	3.E-07	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 Sequence. Cat.	Basis for Categorization
ESD20-HLW-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to an HLW canister, due to a fire, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters	2.E-07	2.E-07	1.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD09-MCO-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO, during canister transfer by a CTM, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	1 MCO and 1 HLW canister	2.E-07	1.E-07	9.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD15-WP-H&D-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during export activities, resulting in an unfiltered radionuclide release. In this sequence the waste package fails, a canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	2.E-07	1.E-07	3.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-MCO-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during preparation activities (unbolting, lid adapter installation), 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	2.E-07	7.E-08	4.E-07	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 Sequence. Cat.	Basis for Categorization
ESD04-MCO-SEQ3-DE	Direct exposure, loss of shielding	This event sequence represents a structural challenge to an MCO inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a direct exposure from loss of shielding. In this sequence the transportation cask fails, and the canister remains intact.	4 MCOs	2.E-07	7.E-08	4.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD04-MCO-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an MCO inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	4 MCOs	2.E-07	7.E-08	4.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-HLW-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in an unfiltered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters	2.E-07	5.E-08	9.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD08-MCO-SEQ04-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO, due to collision between two CTMs during canister transfer, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	1 MCO and another canister	2.E-07	4.E-08	7.E-07	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 Sequence. Cat.	Basis for Categorization
ESD13-WP-H&D-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during WPTT transfer to docking station, resulting in a filtered radionuclide release. In this sequence the waste package fails, a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-07	8.E-08	1.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD10-WP-H&D-SEQ03-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to a combination of a DOE standardized canister and HLW canisters inside a waste package, during WPTT transfer to the Waste Package Positioning Room, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters and 1 DOE standardized canister	1.E-07	6.E-08	1.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD01-HLW-SEQ4-RRF	Filtered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during receipt activities, resulting in a filtered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	5 HLW canisters	1.E-07	6.E-08	3.E-07	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 Sequence. Cat.	Basis for Categorization
ESD04-HLW-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during preparation activities (unbolting, lid adapter installation), resulting in an unfiltered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	5 HLW canisters	1.E-07	4.E-08	5.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD09-DPC-SEQ5-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC, during canister transfer by a CTM, resulting in an unfiltered radionuclide release. In this sequence the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 DPC	1.E-07	4.E-08	3.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-WP-H&M-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a combination of MCOs and HLW canisters inside a waste package, due to a fire, resulting in a filtered radionuclide release. In this sequence a canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	2 HLW canisters and 2 MCOs	9.E-08	9.E-08	3.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD01-HLW-SEQ2-DE	Direct exposure, degradation of shielding	This event sequence represents a structural challenge to an HLW canister inside a transportation cask, during receipt activities, 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	9.E-08	5.E-08	3.E-07	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 Sequence. Cat.	Basis for Categorization
ESD20-DSTD-SEQ3-RRF	Filtered radionuclide release	This event sequence represents a thermal challenge to a DOE standardized canister, due to a fire, resulting in a filtered radionuclide release. In this sequence the canister fails, the confinement boundary remains intact, and a moderator is excluded from entering the canister.	9 DOE standardized canisters	7.E-08	7.E-08	3.E-08	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD20-MCO-SEQ4-RRC	Filtered radionuclide release, important to criticality	This event sequence represents a thermal challenge to an MCO, due to a fire, resulting in a filtered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary remains intact, and a moderator enters the canister.	4 MCOs	7.E-08	2.E-08	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD03-DPC-SEQ6-RRU	Unfiltered radionuclide release	This event sequence represents a structural challenge to a DPC inside a transportation cask, during removal of impact limiters, upending, and transfer to a CTT, resulting in an unfiltered radionuclide release. In this sequence the transportation cask fails, the canister fails, the confinement boundary fails, and a moderator is excluded from entering the canister.	1 DPC	7.E-08	3.E-08	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence
ESD06-MCO-SEQ6-RRC	Unfiltered radionuclide release, important to criticality	This event sequence represents a structural challenge to an MCO inside a transportation cask, during CTT transfer to the Cask Unloading Room, resulting in an unfiltered radionuclide release also important to criticality. In this sequence the canister fails, the confinement boundary fails, and a moderator enters the canister.	4 MCOs	6.E-08	1.E-08	2.E-07	Beyond Category 2	Mean of distribution for number of occurrences of event sequence