$$mean = Median \times e^{\frac{\left(\frac{\ln EF}{1.645}\right)^2}{2}} \qquad \text{(Eq. F-4)}$$

where

EF = error factor

This mean LLW fire frequency is then converted to the total expected number of large (fires which consume the building) LLWF fires over the 50-year preclosure period.

LLW fire frequency (preclosure period)
= 4.1E-01 fires/year × 0.165 large fire propagation probability
= 6.8E-02 large fires

The results of the analysis are the fire initiating event mean frequency, the large fire initiating event mean frequency, and their associated distributions shown below in Table F6-1. The initiating event frequency represents the probability, over the length of the preclosure period, that a fire could threaten a LLW container during the stated vulnerability.

Table F6-1. LLW Fire Initiating Event Frequencies with Associated Distributions

Initiating Event	Mean frequency (per 50 years)	Error Factor	Distribution
Fire threatens LLW in the LLWF	4.1E-01 fires	2.0	Lognormal
Large fire threatens LLW in the LLWF	6.8E-02 fires	2.0	Lognormal

NOTE: LLW = low-level radioactive waste; LLWF = Low-Level Waste Facility.

Source: Original

Table F6-2 shows the calculations that were performed to identify individual room areas, total ignition frequency, and uncertainty distributions.

Table F6-2. Room Areas and Total Ignition Frequency

Room	Length (ft)	Width (ft)	Area (sq-ft)	Area (sq-m)	NOTES
1001	42	102	4,284	398	—
1002	108	81	13,292	1,235	Area multiplied by 2 - room extends two floors
1002A	12	9	216	20	Area multiplied by 2 - room extends two floors
1002B	9	9	162	15	Area multiplied by 2 - room extends two floors
1003	24	32	1,536	143	Area multiplied by 2 - room extends two floors
1004	23	25	1,150	107	Area multiplied by 2 - room extends two floors
1005	15	25	750	70	Area multiplied by 2 - room extends two floors
1006	15	25	750	70	Area multiplied by 2 - room extends two floors
1007	105	9	1,890	176	Area multiplied by 2 - room extends two floors
1008	49	29	2,842	264	Area multiplied by 2 - room extends two floors
1009	49	29	2,842	264	Area multiplied by 2 - room extends two floors
1010	49	29	2,842	264	Area multiplied by 2 - room extends two floors
1011	49	29	2,842	264	Area multiplied by 2 - room extends two floors
1012	113	68	7,684	714	—
1013	26	47	1,222	114	—
1014	26	9	234	22	—
1200-1223	81	68	5,508	512	—
M001	42	95	3,990	371	—
2001	80	66	5,280	491	—

Total Area (sq-m)	**5,514**		
Ignition Frequency (per sq-m/yr)	**1.36E-06**		
Ignition Frequency (per yr)	**7.52E-03**	**EF**	**Mean**
Ignition Frequency (50 years - preclosure period)	**3.76E-01**	**2.00E+00**	**4.11E-01**
Large Fire Propagation Probability	**1.65E-01**		**1.65E-01**
Large Fire Frequency	**6.20E-02**	**2.00E+00**	**6.78E-02**

NOTE: The blank cells in this table are intentional and have been verified.

EF = error factor; ft = feet; m = meter; yr = year.

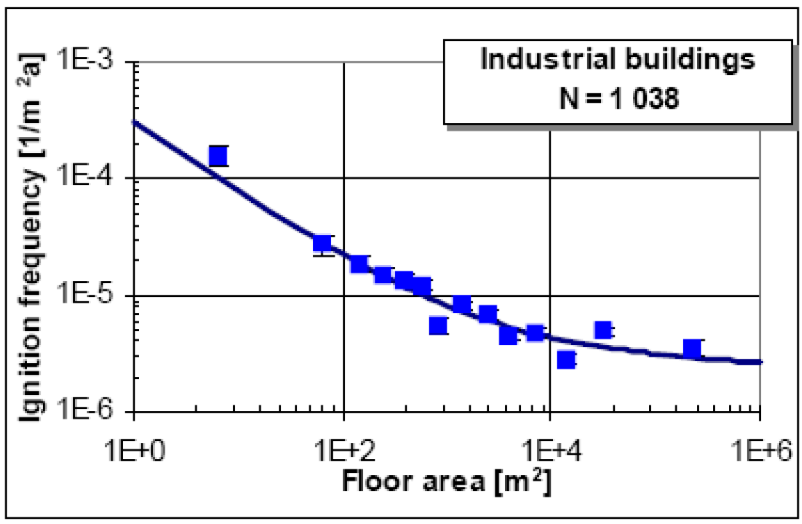
Source: Original

APPENDIX F.I
DERIVATION OF IGNITION FREQUENCY DISTRIBUTION

For proper consideration of the fire frequency analysis of the CRCF, WHF, IHF, and RF, it was necessary to develop an uncertainty distribution for the industrial building fire frequency. The *Utilisation of Statistics to Assess Fire Risks in Buildings* study (Ref. F2.11) used to develop these frequencies presents an equation with floor area as an input to determine frequency. Equation F.I-1 is developed based on sample data collected:

$$f_m''(A) = c_1 A^r + c_2 A^s \qquad \text{(Eq. F.I-1)}$$

where f_m'' is the annual fire frequency per square meter of floor area, A is the floor area, and the values c_1, c_2, r, and s are constants determined by the line of best fit derived from the data. For industrial buildings, the values for the constants are as follows: c_1 = 3E-04, c_2 = 5E-06, r = -0.61, and s = -0.05. The data for industrial buildings and the resulting line of best fit are presented in Figure F.I-1.



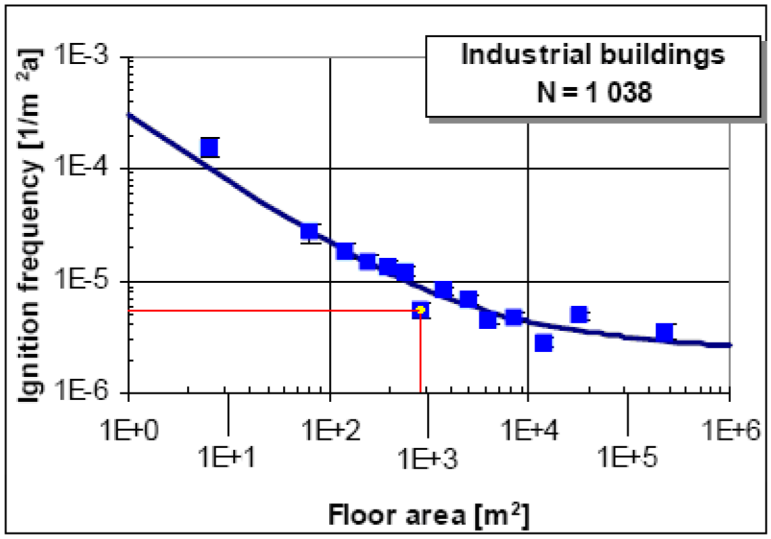
NOTE: a = area; m = meter; n = data sample size.

Source: Ref. F2.11.

Figure F.I-1. Ignition Frequency Observations

Each data point in the graph represents the average of many data points. The individual data points and the average values were not provided. Because the data is only presented graphically, it is necessary to estimate the data for the purposes of this analysis. To accomplish this, the center of each data point is found, and x axis values are added such that the powers increase by a unit of one. Horizontal and vertical lines are drawn from each data point to the x and y axes. The ignition frequency and floor area are then estimated based on the relative distances between these lines and the major axis values. For the example shown in Figure F.I-2, the distance from the 1E+2 label to the red vertical line is divided by the distance from the 1E+2 to 1E+3 labels. In this case, the result is 0.925. Thus, the floor area for the data point is $10^{2.925}$. The ignition frequency is determined in an identical manner. The ignition frequency and floor area obtained

in this manner are displayed in Table F.I-1. The ignition frequency predicted based on Equation F.I-1 is also provided in the table.



NOTE: a = area; m = meter; n = data sample size.

Source: Original

Figure F.I-2. Data Point Determination

Table F.I-1. Ignition Frequency Data from Figure F.I-1 and Equation F.I-1

Graphically Determined Data Points	From Equation 1	
Floor Area (m^2)	Ignition Frequency (1/yr m^2)	Predicted Frequency (1/yr m^2)
7	1.6E-04	9.6E-05
65	2.8E-05	2.8E-05
150	1.9E-05	1.8E-05
240	1.5E-05	1.4E-05
380	1.4E-05	1.2E-05
570	1.2E-05	9.9E-06
840	5.6E-06	8.5E-06
1,400	8.9E-06	7.1E-06
2,500	7.0E-06	5.9E-06
4,100	4.6E-06	5.2E-06
7,100	4.8E-06	4.5E-06
14,000	2.9E-06	4.0E-06
33,000	5.1E-06	3.5E-06
230,000	3.6E-06	2.9E-06

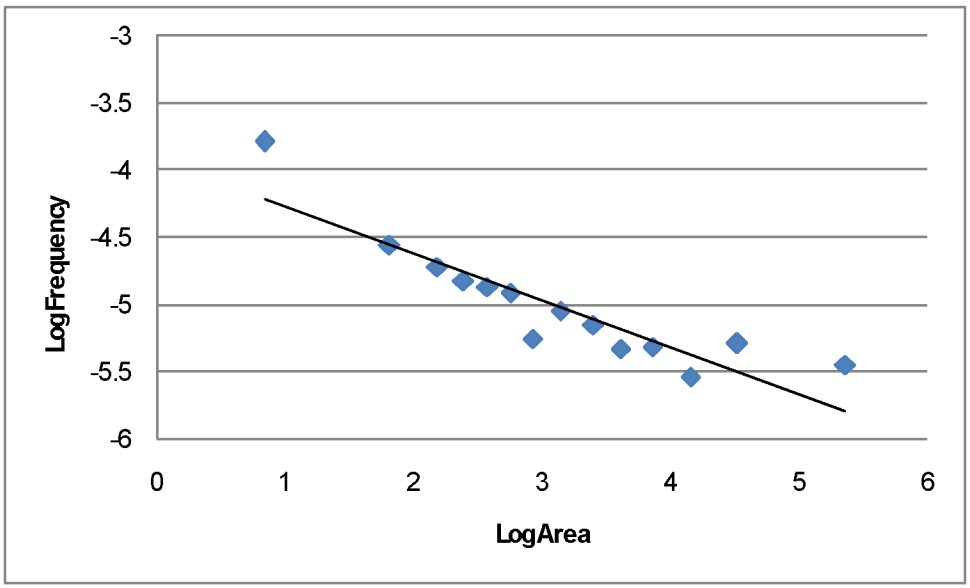
NOTE: m = meter; yr = year.

Source: Original

Because the ignition frequency is determined based on the line of best fit, the uncertainty distribution for the calculated ignition frequency can be determined by estimating the uncertainty in the ability of the best fit equation to predict the ignition frequency of any industrial building not included in the database. This is accomplished using the methodology presented below.

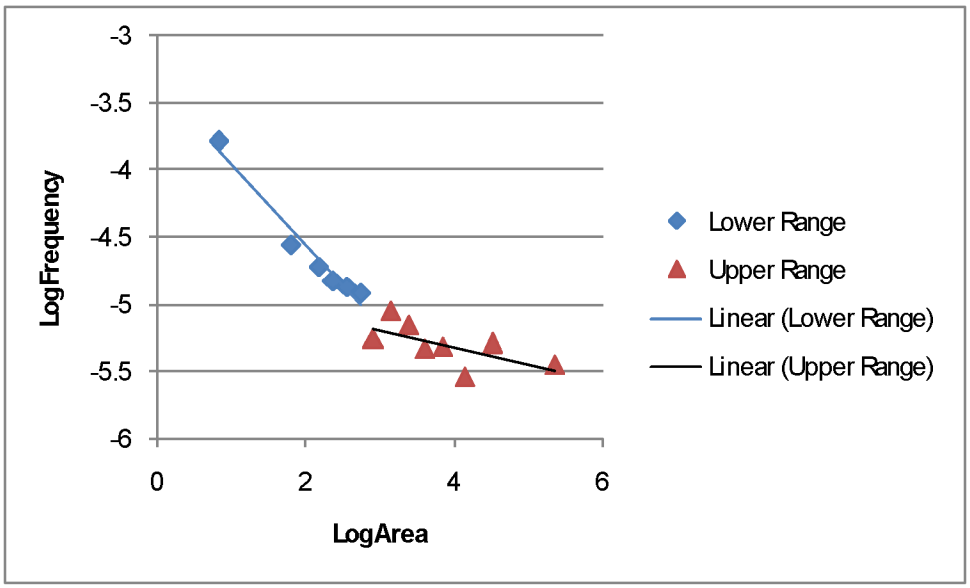
Statistics: Probability, Inference, and Decision (Ref. F2.13) outlines a procedure to determine the confidence limits for a value predicted, based on a linear regression equation. Though the ignition frequency and floor area are not linearly related, as illustrated by the figure and by Equation F.I-1, the relationship between the log of the ignition frequency and the log of the floor area are approximately linear. This is illustrated in Figure F.I-3.

As shown in Figures F.I-1 and F.I-3, the portion of the curve for buildings less than 1,000 m^2 has a steeper slope than the portion of the curve for buildings larger than 1,000 m^2. For that reason, the data was divided into two ranges as shown in Figure F.I-4. Because all of the YMP facilities have floor areas larger than 1,000 m^2, the remaining analysis focused on the upper end of the floor area range.



Source: Original

Figure F.I-3. Plot of Log (Ignition Frequency) as a Function of Log (Floor Area)



Source: Original

Figure F.I-4. Plot of Log (Ignition Frequency) as a Function of Log (Floor Area) Divided into Two Floor Area Ranges

To arrive at the confidence interval for the log of the ignition frequency, Equations F.I-2, F.I-3, F.I-4 are used (Ref. F2.13):

$$\hat{y} \pm a \frac{s_{xy}}{\sqrt{n-2}} \sqrt{n+1+\frac{(x-m_x)^2}{s_x^2}} \qquad \text{(Eq. F.I-2)}$$

$$s_{xy} = \sqrt{s_y^2 (1-r_{xy}^2)} \qquad \text{(Eq. F.I-3)}$$

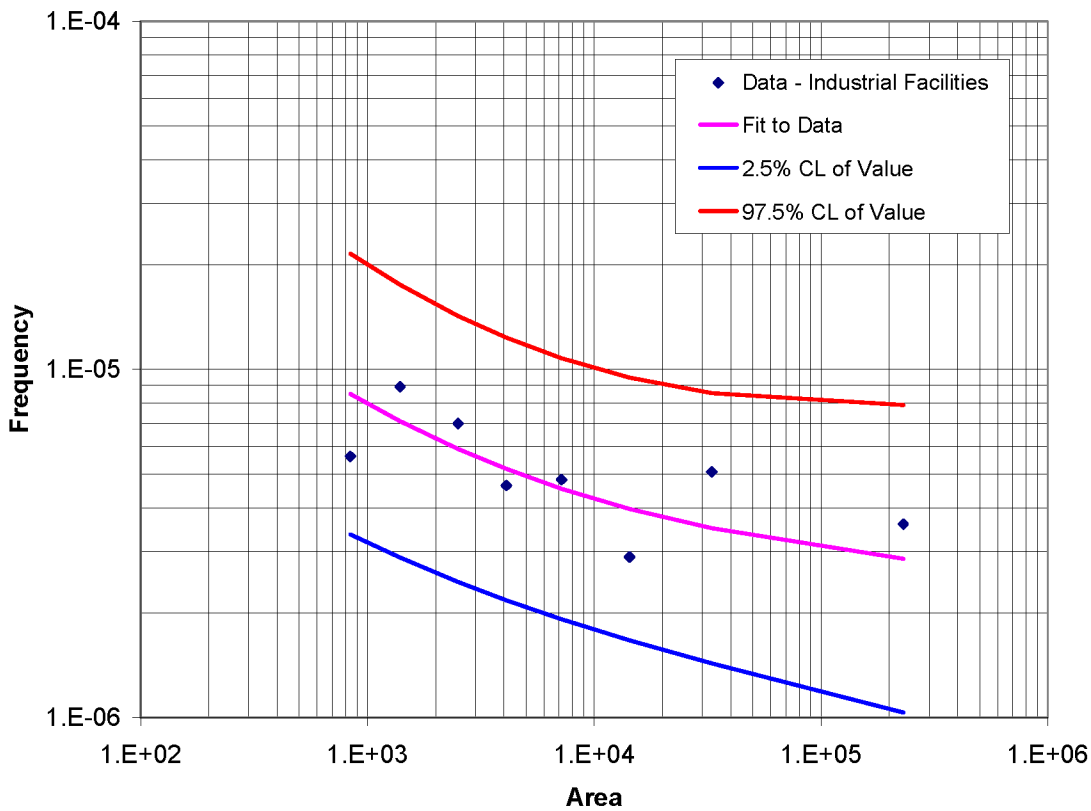
$$r_{xy} = \frac{\sum_{i=0}^{i=n} (x_i - m_x)(y - m_y)}{n\, s_x\, s_y} \qquad \text{(Eq. F.I-4)}$$

where

$\hat{y}$	=	the predicted value for the log of the ignition frequency using Equation F-I.1
x	=	the log of the corresponding floor area value
n	=	number of data points used in the linear regression analysis (8 for the upper floor area range)
a	=	the 1-(α/2) fractile of the t-distribution with n-2 degrees of freedom (for a 95% confidence interval, α is 5% and the value for a is 2.447)
x_i	=	the x data values (log of floor area)

y_i	=	the y data values (log of ignition frequency)
m_x	=	the mean of the x data values
m_y	=	the mean of the y data values
s_x	=	the standard deviation of the x data values
s_y	=	the standard deviation of the y data values

The upper and lower confidence limits (i.e., the 97.5% and 2.5% values) for any predicted value of the ignition frequency can be determined from Equations F.I-2 through F.I-4 using the x-y data for the upper end of the floor area range. The upper and lower confidence limits for the ignition frequency were then determined by taking the anti-log of the predicted y values. Figure F.I-5 is a plot showing the original data, the predicted values using Equation F.I-1, and the upper and lower confidence limits for the predicted values. The same approach can be used to determine the upper and lower confidence limits for the ignition frequency calculated for each of the YMP facilities. Those results are provided in Table F.I-2.



NOTE: CL = confidence limit.

Source: Original

Figure F.I-5. Plot of the Ignition Frequency Data, the Predicted Ignition Frequency, and Confidence Limits for the Predicted Value

The median and 97.5% values are utilized as input into Crystal Ball to obtain an output from the software which includes the mean and median (Table F.I-2). Using this output and Equation F.I-5 (which is Equation F-4 reorganized), the error factor can be calculated for use as an estimated error factor for warehouse buildings.

$$EF = e^{\left(1.645\sqrt{2\ln\frac{mean}{median}}\right)} \qquad \text{(Eq. F.I-5)}$$

where

EF = error factor

Table F.I-2. Calculated Mean and Confidence Limits for the YMP LLWF Ignition Frequency

Facility	Ignition Frequency (Ignitions per sq-m per year)		
	Mean	Median	EF
LLWF	5.30E-06	4.83E-06	2.0

NOTE: This calculation is performed ***only*** for the purpose of determining an error factor to be applied to the LLW fire frequency distribution. The mean and median above are not the actual values, since the parameters for c1, c2, r, and s are for industrial buildings. Section F6 provides the actual calculation of the median fire frequency for the LLWF, to which the 2.0 error factor is applied.

EF = error factor; LLW = low-level radioactive waste; LLWF = Low-Level Waste Facility; YMP = Yucca Mountain Project.

Source: Original

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ATTACHMENT G
EVENT SEQUENCE QUANTIFICATION SUMMARY TABLES

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ATTACHMENT G
EVENT SEQUENCE QUANTIFICATION SUMMARY TABLES

Attachment G contains the Event Sequence Quantification summary table (Table G-1), which is referenced in Section 6.7. It also contains Table G-2, Final Event Sequences Summary; Table G-3, Beyond Category 2 Final Event Sequences Summary; and Table G-4, Important to Criticality Final Event Sequences Summary, which are referenced in Section 6.8. The results in this attachment have been produced from the SAPHIRE model in Attachment H using SAPHIRE's "mincut" (minimal cut set upper bound) option with no frequency cutoff. This well-known method estimates the frequency of an event sequence (the union of the corresponding cut-set frequencies) as 1 minus the product of the complements of the cut set frequencies. The mincut method economically computes accurate event sequence frequencies provided that the cut-set frequencies are not too small (on the order of 10^{-15} or less). If a cut set frequency is actually zero, as it is in some cases, the lack of a contribution to the event sequence frequency is accurately reflected. Likewise, for event sequence frequencies of interest in this analysis, that is, within several orders of magnitude of the Category 2 threshold (10^{-4}), the mincut method produces accurate results. However, when a cut-set frequency is very small but greater than zero, the method would encounter the limits of the numerical precision of the computer. To avoid numerical difficulties, SAPHIRE rounds the complement of the cut set frequency (1 minus the frequency) to 1 when the cut-set frequency is less than about 10^{-15}. This rounding can result in an underestimate of the event sequence frequency and, in the extreme case, a computed value of zero if all of the complements are rounded to 1. As a result of rounding, very small frequency values may be reported as zero in this attachment. Even so, numbers less than 10^{-15} may appear, because they are calculated as 1 minus the product of the complements of numbers greater than about 10^{-15}.

Table G-1. Event Sequence Quantification

Event Tree	Se-quence	Description	Logic	End State	Calc'd Mean	Calc'd Median	Calc'd Std. Deviation
ISO-ESD01-DPC	3-2	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	1.E-08	7.E-09	3.E-08
ISO-ESD01-DPC	3-3	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-DPC	3-4	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	1.E-08	7.E-09	3.E-08
ISO-ESD01-DPC	3-5	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	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-ESD01-DPC	2-2	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	7.E-08	7.E-08	1.E-08
ISO-ESD01-DPC	2-3	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-DPC	2-4	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	7.E-08	7.E-08	1.E-08
ISO-ESD01-DPC	2-5	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-DPC	4-2	N/A - No DPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-DPC	4-3	N/A - No DPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-DPC	4-4	N/A - No DPCs will be transported by TT	—	N/A	—	—	—

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-ESD01-DPC	4-5	N/A - No DPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-DPC	5-2	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	2.E-07	2.E-07	3.E-08
ISO-ESD01-DPC	5-3	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-DPC	5-4	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	2.E-07	2.E-07	3.E-08
ISO-ESD01-DPC	5-5	This sequence represents a structural challenge to a DPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	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-ESD01-HDPC	3-2	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	1.E-08	7.E-09	3.E-08
ISO-ESD01-HDPC	3-3	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HDPC	3-4	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	1.E-08	7.E-09	3.E-08
ISO-ESD01-HDPC	3-5	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-HDPC	2-2	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	7.E-08	7.E-08	1.E-08

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-ESD01-HDPC	2-3	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HDPC	2-4	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	7.E-08	7.E-08	1.E-08
ISO-ESD01-HDPC	2-5	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-HDPC	4-2	N/A - No HDPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-HDPC	4-3	N/A - No HDPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-HDPC	4-4	N/A - No HDPCs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-HDPC	4-5	N/A - No HDPCs will be transported by TT	—	N/A	—	—	—

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-ESD01-HDPC	5-2	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	2.E-07	2.E-07	3.E-08
ISO-ESD01-HDPC	5-3	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HDPC	5-4	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	2.E-07	2.E-07	3.E-08
ISO-ESD01-HDPC	5-5	This sequence represents a structural challenge to an HDPC inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	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-ESD01-HLW	3-2	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	7.E-08	4.E-08	2.E-07
ISO-ESD01-HLW	3-3	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	3-4	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	7.E-08	4.E-08	2.E-07
ISO-ESD01-HLW	3-5	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	2-2	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	4.E-07	4.E-07	6.E-08

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-ESD01-HLW	2-3	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	2-4	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	4.E-07	4.E-07	6.E-08
ISO-ESD01-HLW	2-5	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	4-2	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from degradation of shielding due to a truck trailer collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMTT_COLLIDE, /TCASK_COLLIDE_TT, SHIELD_TCASK_DROP	DED	2.E-05	1.E-05	5.E-05

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-ESD01-HLW	4-3	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from loss of shielding due to a truck trailer collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	4-4	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, CANISTER1, /MODERATOR_SOP	RRU	2.E-08	1.E-08	5.E-08
ISO-ESD01-HLW	4-5	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	5-2	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	1.E-06	1.E-06	2.E-07

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-ESD01-HLW	5-3	This sequence represents a structural challenge to HLW inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-HLW	5-4	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	1.E-06	1.E-06	2.E-07
ISO-ESD01-HLW	5-5	This sequence represents a structural challenge to HLW inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-NAV	3-2	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	2.E-08	8.E-09	4.E-08

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-ESD01-NAV	3-3	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-NAV	3-4	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	2.E-08	8.E-09	4.E-08
ISO-ESD01-NAV	3-5	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-NAV	2-2	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	8.E-08	8.E-08	1.E-08
ISO-ESD01-NAV	2-3	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	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-ESD01-NAV	2-4	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	8.E-08	8.E-08	1.E-08
ISO-ESD01-NAV	2-5	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-NAV	4-2	N/A - No naval canisters will be transported by TT	—	N/A	—	—	—
ISO-ESD01-NAV	4-3	N/A - No naval canisters will be transported by TT	—	N/A	—	—	—
ISO-ESD01-NAV	4-4	N/A - No naval canisters will be transported by TT	—	N/A	—	—	—
ISO-ESD01-NAV	4-5	N/A - No naval canisters will be transported by TT	—	N/A	—	—	—
ISO-ESD01-NAV	5-2	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	2.E-07	2.E-07	4.E-08

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-ESD01-NAV	5-3	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-NAV	5-4	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	2.E-07	2.E-07	4.E-08
ISO-ESD01-NAV	5-5	This sequence represents a structural challenge to a naval canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-MCO	3-2	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	5.E-09	2.E-09	1.E-08

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-ESD01-MCO	3-3	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-MCO	3-4	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	5.E-09	2.E-09	1.E-08
ISO-ESD01-MCO	3-5	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-MCO	2-2	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	2.E-08	2.E-08	3.E-09
ISO-ESD01-MCO	2-3	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	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-ESD01-MCO	2-4	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	2.E-08	2.E-08	3.E-09
ISO-ESD01-MCO	2-5	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-MCO	4-2	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from degradation of shielding due to a truck trailer collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMTT_COLLIDE, /TCASK_COLLIDE_TT, SHIELD_TCASK_DROP	DED	5.E-06	2.E-06	1.E-05
ISO-ESD01-MCO	4-3	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from loss of shielding due to a truck trailer collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, /CANISTER1	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-ESD01-MCO	4-4	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, CANISTER1, /MODERATOR_SOP	RRU	5.E-09	2.E-09	1.E-08
ISO-ESD01-MCO	4-5	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-MCO	5-2	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	7.E-08	7.E-08	1.E-08
ISO-ESD01-MCO	5-3	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	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-ESD01-MCO	5-4	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	7.E-08	7.E-08	1.E-08
ISO-ESD01-MCO	5-5	This sequence represents a structural challenge to an MCO inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-DSTD	3-2	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	2.E-08	8.E-09	4.E-08
ISO-ESD01-DSTD	3-3	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	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-ESD01-DSTD	3-4	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	2.E-08	8.E-09	4.E-08
ISO-ESD01-DSTD	3-5	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-DSTD	2-2	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	8.E-08	8.E-08	1.E-08
ISO-ESD01-DSTD	2-3	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	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-ESD01-DSTD	2-4	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	8.E-08	8.E-08	1.E-08
ISO-ESD01-DSTD	2-5	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-DSTD	4-2	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from degradation of shielding due to a truck trailer collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMTT_COLLIDE, /TCASK_COLLIDE_TT, SHIELD_TCASK_DROP	DED	2.E-05	8.E-06	4.E-05
ISO-ESD01-DSTD	4-3	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from loss of shielding due to a truck trailer collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, /CANISTER1	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-ESD01-DSTD	4-4	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, CANISTER1, /MODERATOR_SOP	RRU	2.E-08	8.E-09	4.E-08
ISO-ESD01-DSTD	4-5	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-DSTD	5-2	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	2.E-07	2.E-07	3.E-08
ISO-ESD01-DSTD	5-3	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	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-ESD01-DSTD	5-4	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	2.E-07	2.E-07	3.E-08
ISO-ESD01-DSTD	5-5	This sequence represents a structural challenge to a DSTD inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-TAD	3-2	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMRC_COLLIDE, /TCASK_COLLIDE_RC, SHIELD_TCASK_COL	DED	3.E-07	1.E-07	7.E-07
ISO-ESD01-TAD	3-3	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar collision. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, /CANISTER1	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-ESD01-TAD	3-4	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, /MODERATOR_SOP	RRU	3.E-07	1.E-07	7.E-07
ISO-ESD01-TAD	3-5	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMRC_COLLIDE, TCASK_COLLIDE_RC, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-TAD	2-2	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to a railcar derailment. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_DERAIL, /TCASK_DERAIL, SHIELD_TCASK_DROP	DED	1.E-06	1.E-06	2.E-07
ISO-ESD01-TAD	2-3	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from loss of shielding due to a railcar derailment. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_DERAIL, TCASK_DERAIL, /CANISTER1	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-ESD01-TAD	2-4	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a railcar derailment. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, /MODERATOR_SOP	RRU	1.E-06	1.E-06	2.E-07
ISO-ESD01-TAD	2-5	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a railcar derailment In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_DERAIL, TCASK_DERAIL, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-TAD	4-2	N/A - No TADs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-TAD	4-3	N/A - No TADs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-TAD	4-4	N/A - No TADs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-TAD	4-5	N/A - No TADs will be transported by TT	—	N/A	—	—	—
ISO-ESD01-TAD	5-2	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON, SHIELD_TCASK_DROPON	DED	4.E-06	4.E-06	6.E-07

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-ESD01-TAD	5-3	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	INTRASITE_JIB_CRANE, TCASK_DROPON, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD01-TAD	5-4	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, /MODERATOR_SOP	RRU	4.E-06	4.E-06	6.E-07
ISO-ESD01-TAD	5-5	This sequence represents a structural challenge to a TAD canister inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-UCSNF	3-2	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	3-3	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	3-4	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	3-5	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	2-2	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—

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-ESD01-UCSNF	2-3	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	2-4	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	2-5	N/A - No UCSNF will be transported by RC	—	N/A	—	—	—
ISO-ESD01-UCSNF	4-2	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in a direct exposure from degradation of shielding due to a truck trailer collision. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_PMTT_COLLIDE, /TCASK_COLLIDE_TT, SHIELD_TCASK_DROP	DED	2.E-04	8.E-05	4.E-04
ISO-ESD01-UCSNF	4-3	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in a direct exposure from loss of shielding due to a truck trailer collision. In this sequence the transportation cask fails, and the canister remains intact.	N/A - No Canister	DEL	N/A	N/A	N/A
ISO-ESD01-UCSNF	4-4	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, /MODERATOR_SOP	RRU	2.E-07	8.E-08	4.E-07

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-ESD01-UCSNF	4-5	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to a truck trailer collision. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_PMTT_COLLIDE, TCASK_COLLIDE_TT, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD01-UCSNF	5-2	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in a direct exposure from degradation of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask remains intact, and the shielding fails.	INTRASITE_JIB_CRANE, /TCASK_DROPON_UCSNF, SHIELD_TCASK_DROPON	DED	2.E-06	2.E-06	3.E-07
ISO-ESD01-UCSNF	5-3	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in a direct exposure from loss of shielding due to an object dropped onto the transportation cask. In this sequence the transportation cask fails, and the canister remains intact.	N/A - No Canister	DEL	N/A	N/A	N/A
ISO-ESD01-UCSNF	5-4	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in an unfiltered radiological release from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, but moderator is prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON_UCSNF, /MODERATOR_SOP	RRU	2.E-06	2.E-06	3.E-07

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-ESD01-UCSNF	5-5	This sequence represents a structural challenge to UCSNF inside a transportation cask resulting in an unfiltered radiological release important to criticality from cask/canister breach due to an object dropped onto the transportation cask. In this sequence the transportation cask and the canister fail, and moderator is not prevented from entering the canister.	INTRASITE_JIB_CRANE, TCASK_DROPON_UCSNF, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD02-DPC	2-2	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in a direct exposure from loss of shielding due to a site transporter collision. In this sequence the canister remains intact, but the aging overpack's shielding fails.	INTRASITE_ST_COLLIDE, /CANISTER_AO_IMPACT, SHIELD_AO_IMPACT	DEL	3.E-05	1.E-05	7.E-05
ISO-ESD02-DPC	2-3	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in an unfiltered radiological release from canister breach due to a site transporter collision. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_ST_COLLIDE, CANISTER_AO_IMPACT, /MODERATOR_SOP	RRU	3.E-08	1.E-08	7.E-08
ISO-ESD02-DPC	2-4	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in an unfiltered radiological release important to criticality from canister breach due to a site transporter collision. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_ST_COLLIDE, CANISTER_AO_IMPACT, MODERATOR_SOP	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-ESD02-DPC	3-2	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in a direct exposure from loss of shielding due to a site transporter dropping an aging overpack. In this sequence the canister remains intact, but the aging overpack's shielding fails.	INTRASITE_ST_AO_DROP, /CANISTER_AO_DROP, SHIELD_AO_DROP	DEL	1.E-10	7.E-11	3.E-10
ISO-ESD02-DPC	3-3	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in an unfiltered radiological release from canister breach due to a site transporter dropping an aging overpack. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_ST_AO_DROP, CANISTER_AO_DROP, /MODERATOR_SOP	RRU	3.E-10	1.E-10	7.E-10
ISO-ESD02-DPC	3-4	This sequence represents a structural challenge to a DPC inside an aging overpack resulting in an unfiltered radiological release important to criticality from canister breach due to a site transporter dropping an aging overpack. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_ST_AO_DROP, CANISTER_AO_DROP, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD02-TAD	2-2	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in a direct exposure from loss of shielding due to a site transporter collision. In this sequence the canister remains intact, but the aging overpack's shielding fails.	INTRASITE_ST_COLLIDE, /CANISTER_AO_IMPACT, SHIELD_AO_IMPACT	DEL	8.E-04	3.E-04	2.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-ESD02-TAD	2-3	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in an unfiltered radiological release from canister breach due to a site transporter collision. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_ST_COLLIDE, CANISTER_AO_IMPACT, /MODERATOR_SOP	RRU	8.E-07	3.E-07	2.E-06
ISO-ESD02-TAD	2-4	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in an unfiltered radiological release important to criticality from canister breach due to a site transporter collision. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_ST_COLLIDE, CANISTER_AO_IMPACT, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD02-TAD	3-2	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in a direct exposure from loss of shielding due to a site transporter dropping an aging overpack. In this sequence the canister remains intact, but the aging overpack's shielding fails.	INTRASITE_ST_AO_DROP, /CANISTER_AO_DROP, SHIELD_AO_DROP	DEL	3.E-09	2.E-09	8.E-09
ISO-ESD02-TAD	3-3	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in an unfiltered radiological release from canister breach due to a site transporter dropping an aging overpack. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_ST_AO_DROP, CANISTER_AO_DROP, /MODERATOR_SOP	RRU	7.E-09	3.E-09	2.E-08

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-ESD02-TAD	3-4	This sequence represents a structural challenge to a TAD canister inside an aging overpack resulting in an unfiltered radiological release important to criticality from canister breach due to a site transporter dropping an aging overpack. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_ST_AO_DROP, CANISTER_AO_DROP, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD03-HDPC	2-2	This sequence represents a structural challenge to an HDPC inside an HTC resulting in a direct exposure from degradation of shielding due to an impact to the cask. In this sequence the cask remains intact, but the shielding fails.	INTRASITE_HCTT_COLLISION, /TCASK_HTC_IMPACT, SHIELD_TCASK_COL	DED	3.E-08	1.E-08	2.E-07
ISO-ESD03-HDPC	2-3	This sequence represents a structural challenge to an HDPC inside an HTC resulting in a direct exposure from loss of shielding due to an impact to the cask. In this sequence the cask fails, and the canister remains intact.	INTRASITE_HCTT_COLLISION, TCASK_HTC_IMPACT, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD03-HDPC	2-4	This sequence represents a structural challenge to an HDPC inside an HTC resulting in an unfiltered radiological release from breach of canister due to an impact to the cask. In this sequence the cask and canister fail, but moderator is prevented from entering the canister.	INTRASITE_HCTT_COLLISION, TCASK_HTC_IMPACT, CANISTER1, /MODERATOR_SOP	RRU	3.E-08	1.E-08	2.E-07
ISO-ESD03-HDPC	2-5	This sequence represents a structural challenge to an HDPC inside an HTC resulting in an unfiltered radiological release important to criticality from breach of canister due to an impact to the cask. In this sequence the cask and canister fail, and moderator is not prevented from entering the canister.	INTRASITE_HCTT_COLLISION, TCASK_HTC_IMPACT, CANISTER1, MODERATOR_SOP	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-ESD03-HDPC	3-2	This sequence represents a structural challenge to an HDPC inside an HTC resulting in a direct exposure from degradation of shielding due to a drop of the cask from the cask transfer trailer. In this sequence the cask remains intact, but the shielding fails.	INTRASITE_HCTT_DROP, /TCASK_HTC_DROP, SHIELD_TCASK_DROP	DED	2.E-05	7.E-06	1.E-04
ISO-ESD03-HDPC	3-3	This sequence represents a structural challenge to an HDPC inside an HTC resulting in a direct exposure from loss of shielding due to a drop of the cask from the cask transfer trailer. In this sequence the cask fails, and the canister remains intact.	INTRASITE_HCTT_DROP, TCASK_HTC_DROP, /CANISTER1	DEL	0.E+00	0.E+00	0.E+00
ISO-ESD03-HDPC	3-4	This sequence represents a structural challenge to an HDPC inside an HTC resulting in an unfiltered radiological release from breach of canister due to a drop of the cask from the cask transfer trailer. In this sequence the cask and canister fail, but moderator is prevented from entering the canister.	INTRASITE_HCTT_DROP, TCASK_HTC_DROP, CANISTER1, /MODERATOR_SOP	RRU	2.E-05	7.E-06	1.E-04
ISO-ESD03-HDPC	3-5	This sequence represents a structural challenge to an HDPC inside an HTC resulting in an unfiltered radiological release important to criticality from breach of canister due to a drop of the cask from the cask transfer trailer. In this sequence the cask and canister fail, and moderator is not prevented from entering the canister.	INTRASITE_HCTT_DROP, TCASK_HTC_DROP, CANISTER1, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD04-HDPC	2-2	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in a direct exposure from loss of shielding due to an impact to the cask or canister. In this sequence the canister remains intact, but the shielding fails.	INTRASITE_HAM_INSERT, /CANISTER_HAM_OPS, SHIELD_HAM_IMPACT	DEL	7.E-06	5.E-06	1.E-05

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-ESD04-HDPC	2-3	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in an unfiltered radiological release from canister breach due to an impact to the cask or canister. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_HAM_INSERT, CANISTER_HAM_OPS, /MODERATOR_SOP	RRU	7.E-06	5.E-06	1.E-05
ISO-ESD04-HDPC	2-4	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in an unfiltered radiological release important to criticality from canister breach due to an impact to the cask or canister. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_HAM_INSERT, CANISTER_HAM_OPS, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD04-HDPC	3-2	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in a direct exposure from loss of shielding due to an impact to the HAM. In this sequence the canister remains intact, but the shielding fails.	INTRASITE_HAM_AUX_EQUIP, /CANISTER_HAM_IMPACT, SHIELD_HAM_IMPACT	DEL	2.E-05	7.E-06	5.E-05
ISO-ESD04-HDPC	3-3	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in an unfiltered radiological release from canister breach due to an impact to the HAM. In this sequence the canister fails, but moderator is prevented from entering the canister.	INTRASITE_HAM_AUX_EQUIP, CANISTER_HAM_IMPACT, /MODERATOR_SOP	RRU	2.E-08	7.E-09	5.E-08

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-ESD04-HDPC	3-4	This sequence represents a structural challenge to an HDPC during insertion/retrieval operations between an HTC and a HAM, resulting in an unfiltered radiological release important to criticality from canister breach due to an impact to the HAM. In this sequence the canister fails, and moderator is not prevented from entering the canister.	INTRASITE_HAM_AUX_EQUIP, CANISTER_HAM_IMPACT, MODERATOR_SOP	RUC	0.E+00	0.E+00	0.E+00
ISO-ESD05-LLWDAW	3-2	This sequence represents a structural challenge to a DAW LLW container containing a Stage 1 ITS HEPA filter from the WHF, resulting in an unfiltered radiological release in the LLWF due to an impact to the container. In this sequence the container fails.	ISO_ESD05_Forklift_LLW_Impact, CONTAINER_LLW	RRU	6.E-02	2.E-02	2.E-01
ISO-ESD05-LLWWETnr	3-2	This sequence represents a structural challenge to a Wet-Solid LLW container containing a Spent Fuel Pool filter from the WHF, resulting in an unfiltered radiological release in the LLWF due to an impact to the container. In this sequence the container fails.	ISO_ESD05_Forklift_LLW_Impact, CONTAINER_LLW	RRU	5.E-03	2.E-03	1.E-02
ISO-ESD05-LLWLIQ	3-2	This sequence represents a structural challenge to a Liquid LLW container (such as a high-integrity container) at the outside tank area of the LLWF, resulting in an unfiltered radiological release due to an impact to the container. In this sequence the container fails.	SCREENED: Liquid LLW release for this event is not analyzed for categorization, because the consequences to a worker for this type of release are a small fraction of the performance objectives (Ref. 2.2.30, *Preclosure Consequence Analyses*, 000-00C-MGR0-00900-000-00E, Appendix IV).	RRU	—	—	—

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-ESD06-LLW	No se-quence	This sequence represents structural challenge to all the DAW LLW containers in the LLWF, resulting in an unfiltered radiological release due to an event that breaches the entire inventory of containers in the LLWF. In this sequence the containers fail.	NOT ANALYZED IN THIS DOCUMENT: DAW LLW release caused by a non-fire event that collapses the LLWF must be an external event. Except for seismic events, external events are screened in 000-00C-MGR0-00500-000-00C, *External Events Screening Analysis* (Ref. 2.2.26). Seismic is addressed in the seismic analysis (Ref. 2.4.4, 000-PSA-MGR0-01100-000-00A, *Seismic Event Sequence Quantification and Categorization*). Collapse of the LLWF is analyzed for consequence in *Preclosure Consequence Analyses* (Ref. 2.2.30)	RRU	—	—	—
ISO-ESD07-LLW	3-2	This sequence represents a thermal challenge to all combustible DAW LLW containers in the LLWF, resulting in an unfiltered radiological release due to a fire event at the LLWF. In this sequence the containers fail.	ISO_ESD07_Ignition_Freq_LLW, CONTAINER_LLW	RRU	7.E-02	6.E-02	3.E-02
ISO-ESD08-LLWDAW	3-2	This sequence represents a structural challenge to DAW LLW (ITS HEPA filters) containers during transfer to the LLWF, resulting in an unfiltered radiological release due to an impact. In this sequence the containers fail.	ISO_ESD08_INTRASITE_HEPA_TRANSFER, CONTAINER_LLW	RRU	2.E-03	9.E-04	5.E-03
ISO-ESD08-LLWWETr	2-2	This sequence represents a structural challenge to a Wet-Solid LLW container (containing resins only) during transfer from WHF to the GROA boundary, resulting in an unfiltered radiological release due to a collision or equipment failure. In this sequence the container fails.	ISO_ESD08_INTRASITE_HEPA_TRANSFER_Wet_resin, CONTAINER_LLW	RRU	2.E-04	8.E-05	5.E-04

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-ESD08-LLWWETnr	5-2	This sequence represents a structural challenge to a Wet-Solid LLW container (excluding resins) during transfer to the LLWF, resulting in an unfiltered radiological release due to a collision or equipment failure. In this sequence the container fails.	ISO_ESD08_INTRASITE_COLL_TRANSFER_Wet_nr, CONTAINER_LLW	RRU	2.E-03	1.E-03	3.E-03
ISO-ESD08-LLWLIQ	3-2	This sequence represents a structural challenge to Liquid LLW containers during transfer to the LLWF, resulting in an unfiltered radiological release due to an impact. In this sequence the container fails.	SCREENED Liquid LLW release for this event is not analyzed for categorization, because the consequences to a worker for this type of release are a small fraction of the performance objectives (Ref. 2.2.30, *Preclosure Consequence Analyses*, Appendix IV).	—	—	—	—
ISO-ESD08-LLWLIQ	4-2	This sequence represents a structural challenge to Liquid LLW double-walled transfer piping during transfer of WHF's Liquid LLW to the LLWF, resulting in an unfiltered radiological release due to an impact or equipment failure. In this sequence the container (or containment boundary) fails.	SCREENED Liquid LLW release for this event is not analyzed for categorization, because the consequences to a worker for this type of release are a small fraction of the performance objectives (Ref. 2.2.30, *Preclosure Consequence Analyses*, Appendix IV).	—	—	—	—
ISO-ESD08-LLWLIQ	5-2	This sequence represents a structural challenge to Liquid LLW container or equipment during transfer of non-WHF Liquid LLW to the LLWF, resulting in an unfiltered radiological release due to a equipment failure. In this sequence the container fails.	SCREENED Liquid LLW release for this event is not analyzed for categorization, because the consequences to a worker for this type of release are a small fraction of the performance objectives (Ref. 2.2.30, *Preclosure Consequence Analyses*, Appendix IV).	—	—	—	—

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-DPC	2-2	This sequence represents a thermal challenge to a DPC 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-DPC	2-3	This sequence represents a thermal challenge to a DPC 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-DPC	2-4	This sequence represents a thermal challenge to a DPC 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-DPC	3-2	This sequence represents a thermal challenge to a DPC 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	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-DPC	3-3	This sequence represents a thermal challenge to a DPC 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-DPC	3-4	This sequence represents a thermal challenge to a DPC 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	6.E-10	2.E-10	2.E-09
ISO-ESD09-DPC	4-2	This sequence represents a thermal challenge to a DPC 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
ISO-ESD09-DPC	4-3	This sequence represents a thermal challenge to a DPC 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

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-DPC	4-4	This sequence represents a thermal challenge to a DPC 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	6.E-10	2.E-10	2.E-09
ISO-ESD09-DPC	5-2	This sequence represents a thermal challenge to a DPC 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-DPC	5-3	This sequence represents a thermal challenge to a DPC 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
ISO-ESD09-DPC	5-4	This sequence represents a thermal challenge to a DPC 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