

Table 8 Summary of Baseline and Residual Risks – MiniBooNE Detector

Risk Tables Description		Baseline Risk	Residual Risk
8.1	Flammable & Combustible Materials – Onsite-1 Facility Worker	R: *	R: *
8.2	Flammable & Combustible Materials – Onsite-2 Co-located worker	R: *	R: *
8.3	Flammable & Combustible Materials – MOI Offsite	R: *	R: *
8.4	Thermal Energy – Onsite-1 Facility Worker	R: *	R: *
8.5	Thermal Energy – Onsite-2 Co-located Worker	R: *	R: *
8.6	Thermal Energy – MOI Offsite	R: *	R: *
8.7	Kinetic Energy – Onsite-1 Facility Worker	R: *	R: *
8.8	Kinetic Energy – Onsite-2 Co-located Worker	R: *	R: *
8.9	Kinetic Energy – MOI Offsite	R: *	R: *
8.10	Potential Energy- Onsite-1 Facility Worker	R: *	R: *
8.11	Potential Energy – Onsite-2 Co-located Worker	R: *	R: *
8.12	Potential Energy – MOI Offsite	R: *	R: *
8.13	Other Hazards – Onsite-1 Facility Worker	R: *	R: *
8.14	Other Hazards – Onsite-2 Co-located Worker	R: *	R: *
8.15	Other Hazards – MOI Offsite	R: *	R: *
8.16	Access & Egress – Onsite-1 Facility Worker	R: *	R: *
8.17	Access & Egress – Onsite-2 Co-located Worker	R: *	R: *
8.18	Access & Egress – MOI Offsite	R: *	R: *
8.19	Environmental Hazards	R: *	R: *

* This hazard has been evaluated within the common Risk Matrix table included in SAD Section I Chapter 04 *Safety Analysis*. Work in the specified areas involving this hazard implements the controls specified in the common Risk Matrix table. No unique controls are in use.

NOTE:

Per DOE-HDBK-1163-2020, Appendix C, “Risk Assessment Methodology”:

“Events with an unmitigated risk value of III or IV would not require additional control assignments to provide reasonable assurance of adequate protection. Whereas, for events with an unmitigated risk value of I or II, controls would need to be assigned to either reduce the likelihood or the consequence, and therefore the overall mitigated risk. Generally, preventive controls are applied prior to a loss event – reflecting a likelihood reduction and mitigative controls are applied after a loss event – reflecting a consequence reduction. Each control is credited for a single “bin drop” either in likelihood or consequence; not both. Following a standard hierarchy of controls, controls are applied until the residual risk is acceptable – reflecting a mitigated risk value of III or IV. After controls are credited, events with a remaining unacceptable residual risk (i.e., I or II) are candidates for additional analyses and additional controls, often quantitative in nature.” For Fermilab, these controls for accelerator-specific hazards are identified as Credited Controls and further summarized in the Accelerator Safety Envelope (ASE).

Table 8.1 Flammable and Combustible Materials – Onsite -1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Combustible materials (cables, Boxes, Paper, wood cribbing, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Flammable Materials (Flammable gas, cleaning materials, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																

	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.2 Flammable and Combustible Materials – Onsite -2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Combustible materials (cables, Boxes, Paper, wood cribbing, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Flammable Materials (Flammable gas, cleaning materials, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																

	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.3 Flammable and Combustible Materials – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Combustible materials (cables, Boxes, Paper, wood cribbing, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Flammable Materials (Flammable gas, cleaning materials, etc.)	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																

	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.4 Thermal Energy – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Hot Work	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)		Onsite-1 (facility worker)																														
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU		BEU																														
Consequences	H	I	I	II		III																														
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level																																

Table 8.5 Thermal Energy – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Hot Work	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern	
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level

		Risk Matrix			
		Likelihood			
Consequences		A	U	EU	BEU
		H	I	I	II
M	II	II	III	IV	
L	III	III	IV	IV	
N	IV	IV	IV	IV	

Table 8.6 Thermal Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Hot Work	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)		Onsite-1 (facility worker)																														
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU		BEU																														
Consequences	H	I	I	II		III																														
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level																																

Table 8.7 Kinetic Energy – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Power tools	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Pumps and Motors	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern																																	
	Risk Matrix <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">Consequences</th> <th>H</th> <td style="background-color: #f8d7da;">I</td> <td style="background-color: #f8d7da;">I</td> <td style="background-color: #d4edda;">II</td> <td style="background-color: #d4edda;">III</td> </tr> <tr> <th>M</th> <td style="background-color: #fff3cd;">II</td> <td style="background-color: #fff3cd;">II</td> <td style="background-color: #d4edda;">III</td> <td style="background-color: #d4edda;">IV</td> </tr> <tr> <th>L</th> <td style="background-color: #d4edda;">III</td> <td style="background-color: #d4edda;">III</td> <td style="background-color: #d4edda;">IV</td> <td style="background-color: #d4edda;">IV</td> </tr> <tr> <th>N</th> <td style="background-color: #d4edda;">IV</td> <td style="background-color: #d4edda;">IV</td> <td style="background-color: #d4edda;">IV</td> <td style="background-color: #d4edda;">IV</td> </tr> </tbody> </table>							Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
			A	U	EU	BEU																														
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																

	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	
--	----------	--	--	--	--

Table 8.8 Kinetic Energy – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Power tools	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Pumps and Motors	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																						
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																																	
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	<table border="1"> <thead> <tr> <th colspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th colspan="2"></th> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood						A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																			
			A	U		EU	BEU																															
	Consequences	H	I	I		II	III																															
M		II	II	III	IV																																	
L		III	III	IV	IV																																	
N		IV	IV	IV	IV																																	
H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																			
M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																			
L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																			

Table 8.9 Kinetic Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Power tools	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Pumps and Motors	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																	
	H C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																	
	M C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																	

	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
--	----------	-------------------------------------	--	--	--

Table 8.10 Potential Energy – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Crane Operations	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Compressed Gasses	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Material Handling	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no	C³ Serious injury, no immediate loss of life no																																

			permanent disabilities; hospitalization required.	permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.11 Potential Energy – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Crane Operations	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Compressed Gasses	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Material Handling	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																	
	H C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																	
	M C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no	C ³ Serious injury, no immediate loss of life no																																	

			permanent disabilities; hospitalization required.	permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.12 Potential Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Crane Operations	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Compressed Gasses	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Material Handling	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated ($L > 1.0E-02$) U = Unlikely ($1.0E-02 > L > 1.0E-04$) EU = Extremely Unlikely ($1.0E-04 > L > 1.0E-06$) BEU = Beyond Extremely Unlikely ($1.0E-06 > L$)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no	C³ Serious injury, no immediate loss of life no																																

			permanent disabilities; hospitalization required.	permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.13 Other hazards – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Confined Spaces	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Noise	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Silica	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Ergonomics	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Working at Heights	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences)	H	C ³ Irreversible, other serious effects, or	C ³ Prompt worker fatality or acute injury that is	C ³ Prompt worker fatality or acute injury that is	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															

Acronyms MOI = Maximally-exposed Offsite Individual		symptoms which could impair an individual's ability to take protective action.	immediately life-threatening or permanently disabling.	immediately life-threatening or permanently disabling.	
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.14 Other hazards – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Confined Spaces	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Noise	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Silica	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Ergonomics	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Working at Heights	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences)	H	C ³ Irreversible, other serious effects, or	C ³ Prompt worker fatality or acute injury that is	C ³ Prompt worker fatality or acute injury that is	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU		BEU																														
Consequences	H	I	I	II		III																														
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
C																																				

Acronyms MOI = Maximally-exposed Offsite Individual		symptoms which could impair an individual's ability to take protective action.	immediately life-threatening or permanently disabling.	immediately life-threatening or permanently disabling.	
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.15 Other hazards – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Confined Spaces	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Noise	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Silica	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Ergonomics	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Working at Heights	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences)	H	C ³ Irreversible, other serious effects, or	C ³ Prompt worker fatality or acute injury that is	C ³ Prompt worker fatality or acute injury that is	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															

Acronyms MOI = Maximally-exposed Offsite Individual		symptoms which could impair an individual's ability to take protective action.	immediately life-threatening or permanently disabling.	immediately life-threatening or permanently disabling.	
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	

Table 8.16 Access & Egress – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Life Safety Egress	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)		Onsite-1 (facility worker)																														
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU		BEU																														
Consequences	H	I	I	II		III																														
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level																																

Table 8.17 Access & Egress – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Life Safety Egress	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix																															
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)		Onsite-1 (facility worker)																														
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	<table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
		Likelihood																																		
		A	U	EU		BEU																														
Consequences	H	I	I	II		III																														
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.																																
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C																																
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level																																

Table 8.18 Access & Egress – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Life Safety Egress	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern	
	Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)
	H	C ³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C ³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.
	M	C ³ Mild, transient adverse effects.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.	C ³ Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level

		Risk Matrix			
		Likelihood			
Consequences		A	U	EU	BEU
	H	I	I	II	III
	M	II	II	III	IV
	L	III	III	IV	IV
N	IV	IV	IV	IV	

Table 8.19 Environmental Hazards

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Hazard to Air	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Hazard to Water	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:
Hazard to Soil	<i>Hazard: N/A</i>	L: C: R:	See Section 1, Chapter 4.	L: C: R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.																																				
Likelihood (L, of event)/year A = Anticipated (L > 1.0E-02) U = Unlikely (1.0E-02 > L > 1.0E-04) EU = Extremely Unlikely (1.0E-04 > L > 1.0E-06) BEU = Beyond Extremely Unlikely (1.0E-06 > L)	Consequence (C, of event)/year H = High M = Moderate L = Low N = Negligible		Risk (R, Qualitative Ranking) I = situation (event) of major concern II = situation (event) of concern III = situation (event) of minor concern IV = situation (event) of minimal concern		Risk Matrix <table border="1"> <thead> <tr> <th colspan="2" rowspan="2"></th> <th colspan="4">Likelihood</th> </tr> <tr> <th>A</th> <th>U</th> <th>EU</th> <th>BEU</th> </tr> </thead> <tbody> <tr> <th rowspan="4">Consequences</th> <th>H</th> <td>I</td> <td>I</td> <td>II</td> <td>III</td> </tr> <tr> <th>M</th> <td>II</td> <td>II</td> <td>III</td> <td>IV</td> </tr> <tr> <th>L</th> <td>III</td> <td>III</td> <td>IV</td> <td>IV</td> </tr> <tr> <th>N</th> <td>IV</td> <td>IV</td> <td>IV</td> <td>IV</td> </tr> </tbody> </table>			Likelihood				A	U	EU	BEU	Consequences	H	I	I	II	III	M	II	II	III	IV	L	III	III	IV	IV	N	IV	IV	IV	IV
			Likelihood																																	
A			U	EU	BEU																															
Consequences	H	I	I	II	III																															
	M	II	II	III	IV																															
	L	III	III	IV	IV																															
	N	IV	IV	IV	IV																															
Control(s) Type P = Preventive (reduce event occurrence likelihood) M = Mitigative (reduces event consequences) Acronyms MOI = Maximally-exposed Offsite Individual	C	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)																																
	H	C³ Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.	C³ Prompt worker fatality or acute injury that is immediately life-threatening or permanently disabling.																																
	M	C³ Mild, transient adverse effects.	C³ Serious injury, no immediate loss of life no	C³ Serious injury, no immediate loss of life no																																

			permanent disabilities; hospitalization required.	permanent disabilities; hospitalization required.	
	L	Mild, transient adverse effects > C	Minor injuries; no hospitalization > C	Minor injuries; no hospitalization > C	
	N	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	Consequences less than those for Low Consequence Level	