Table 12. Summary of Baseline and Residual Risks - NuMI

	Risk Tables Description	Baseline Risk	Residual Risk
12.1	Radiological – Onsite-1 Facility Worker	R: I	R: IV
12.2	Radiological – Onsite-2 Co-located Worker	R: I	R: IV
12.3	Radiological – MOI Offsite	R: I	R: IV
12.4	Toxic Materials – Onsite 1 Facility Worker	R: III	R: IV
12.5	Toxic Materials – Onsite 2 Co-located Worker	R: III	R: IV
12.6	Toxic Materials – MOI Offsite	R: III	R: IV
12.7	Flammable & Combustible Materials – Onsite-1 Facility Worker	R: *	R: *
12.8	Flammable & Combustible Materials – Onsite-2 Co-located worker	R: *	R: *
12.9	Flammable & Combustible Materials – MOI Offsite	R: *	R: *
12.10	Electrical Energy – Onsite-1 Facility Worker	R: *	R: *
12.11	Electrical Energy – Onsite-2 Co-located Worker	R: *	R: *
12.12	Electrical Energy – MOI Offsite	R: *	R: *
12.13	Thermal Energy – Onsite-1 Facility Worker	R: *	R: *
12.14	Thermal Energy – Onsite-2 Co-located Worker	R: *	R: *
12.15	Thermal Energy – MOI Offsite	R: *	R: *
12.16	Kinetic Energy – Onsite-1 Facility Worker	R: *	R: *
12.17	Kinetic Energy – Onsite-2 Co-located Worker	R: *	R: *
12.18	Kinetic Energy – MOI Offsite	R: *	R: *
12.19	Potential Energy- Onsite-1 Facility Worker	R: *	R: *
12.20	Potential Energy – Onsite-2 Co-located Worker	R: *	R: *
12.21	Potential Energy – MOI Offsite	R: *	R: *
12.22	Magnetic Fields – Onsite-1 Facility Worker	R: *	R: *
12.23	Magnetic Fields – Onsite-2 Co-located Worker	R: *	R: *
12.24	Magnetic Fields – MOI Offsite	R: *	R: *
12.25	Other Hazards – Onsite-1 Facility Worker	R: *	R: *
12.26	Other Hazards – Onsite-2 Co-located Worker	R: *	R: *
12.27	Other Hazards – MOI Offsite	R: *	R: *
12.28	Access & Egress – Onsite-1 Facility Worker	R: *	R: *
12.29	Access & Egress – Onsite-2 Co-located Worker	R: *	R: *
12.30	Access & Egress – MOI Offsite	R: *	R: *
12.31	Environmental Hazards	R: *	R: *

<sup>\*</sup> 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 12.1 Radiological – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Residual	Hazard: Exposure to ionizing radiation	L: A	P – General and/or Job Specific RWP: A Radiological Work Permit is	L: BEU
Activation	beyond regulatory limits.	C: H R: I	<ul> <li>Written by ES&amp;H that specifies the work that is permitted to be performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P — Use of on LSM: Use of a log survey monitor is specified by a RWP. The LSM allows for real time monitoring of radiation levels during work.</li> <li>P — Radiological Training: An educational system managed by ES&amp;H that establishes basic worker knowledge through presentations and testing.</li> <li>M — Radiological Signage and Decay Time Requirements: Signs located in various places throughout the accelerator complex warn of various hazards and occupancy restrictions prior to entry. Furthermore, work may be restricted or prevented until sufficient time has passed such that radiation levels are sufficiently low to allow for safer work to proceed. This mitigation has passive and active components.</li> <li>M — Target Pile Shielding: Material placed between radiation sources in the target pile and the enclosure to be protected. This is a passive mitigation.</li> <li>P — As needed: the RCT or RSO will monitor the job as specified by the RWP.</li> </ul>	C: L R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Groundwater	Hazard: Radionuclides in ground	L: A	P – Active and automatic beam tuning is performed to limit beam	L: BEU
Activation	water exceed regulatory levels	C: H	losses.	C: L
		R: I	P – Monitoring wells are sampled periodically to determine the levels if any detectable in the groundwater.	R: IV
			P – Sump pump systems are engineered systems engineered to limit water radioactivation.	
Surface Water	Hazard: Radionuclides in surface	L: A	See Section I Chapter 04	L: BEU
Activation	water exceed regulatory levels	C: H		C: L
		R: I		R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Radioactive	Hazard: Persons are exposed, beyond	L: A	P – RAW Key Control System: Multiple key systems prevent personnel	L: BEU
Water (RAW)	regulatory levels, to radioactive water	C: H	access to radioactive water systems.	C: L
Systems		R: 1	<ul> <li>P – Secondary Containment is engineered containment that prevents unintended exposure to contaminated water.</li> <li>P – General and/or Job Specific RWP: A Radiological Work Permit is written by ES&amp;H that specifies the work that is permitted to be performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P – Use Of an LSM: Use of a log survey monitor is specified by a RWP. The LSM allows for real time monitoring of radiation levels during work.</li> <li>M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.</li> <li>M – RCT Or RSO Monitoring: A RWP will specify that a Radiation Control Technician or Radiation Safety Officer be present during certain kinds of work or work conditions. The radiological expert can make real time decisions to limit, stop, or prevent radiation exposure to personnel. This is an active mitigation.</li> </ul>	R: IV
Air Activation	Hazard: Radionuclides in air exceed	L: A	See Section I Chapter 04	L: EU
	regulatory levels	C: H		C: N
	-5 ,	R: I		R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Soil Interactions	Hazard: Radionuclides are produced	L: A	P – Active and automatic beam tuning is performed to limit beam	L: U
	by beam which may contaminate soil	C: N	losses.	C: N
	near the decay pipe	R: IV	<ul> <li>M – Beamline Design and Engineered Beam Dump: the beamline is designed that includes measures to reduce unwanted beam particle losses, as well as the use of a beam dump (absorber) design that minimizes radiological leakage through the use of shielding. This is a passive mitigation.</li> <li>M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.</li> <li>M – Past studies have characterized the migration of tritium into shielding and lessons have been applied.</li> </ul>	R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Radioactive	Hazard: Persons are exposed to	L: A	P – General and/or Job Specific RWP: A Radiological Work Permit is	L: EU
Waste	ionizing radiation beyond regulatory	C: L	written by ES&H that specifies the work that is permitted to be	C: N
	levels	R: III	<ul> <li>performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P – Use Of an LSM: Use of a log survey monitor is specified by a RWP. The LSM allows for real time monitoring of radiation levels during work.</li> <li>M – Decay Time Requirements: Work may be restricted or prevented until sufficient time has passed such that radiation levels are sufficiently low to allow for safer work to proceed. This is an active mitigation.</li> <li>M – Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is an active mitigation.</li> </ul>	R: IV

Hazard Hazard Description		Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)	
Contamination	Hazard: Persons are exposed to ionizing radiation beyond regulatory levels	C: H R: I	<ul> <li>unintended exposure to sources and personnel.</li> <li>P - Radiological Surveying and Cleaning: RCTs and RSOs survey for and clean radiological contamination as part of the RWP process.</li> <li>P - General and/or Job Specific RWP: A Radiological Work Permit is written by ES&amp;H that specifies the work that is permitted to be performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P - Use of an LSM: Use of a log survey monitor is specified by a RWP as necessary. The LSM allows for real time monitoring of radiation levels during work.</li> <li>M - Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified</li> </ul>	C: L R: IV	
			appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is an active mitigation. Active mitigation by containing contaminated items to prevent release is used as necessary  M – PPE: A RWP may specify that personal protective equipment be used during certain kinds of work or work conditions. The PPE limits the likelihood of bodily exposure to activated material and contamination. This is an active mitigation.		
<sup>7</sup> Be	Hazard: Potential radiation exposure to <sup>7</sup> Be (uptake/committed dose).	L: A C: N R: IV	No prevention or mitigation is required. <sup>7</sup> Be isn't hazardous in this pattern of use by facility.	L: A C: N R: IV	

Likelihood (L, of event)/year	Con	sequence (C, of event)/	year	Risk (R, Qualitative Ra	nking)	Risk	Matrix	[			
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (even	t) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	II = situation (event) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (eve	nt) of minor concern	ces	Н	I	1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible		IV = situation (eve	ent) of minimal concern	enc	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsit	e-2 (co-located worker)	Onsite-1 (facility worker)	nbə		Ш	III	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	<b>C</b> <sup>3</sup> 25.0 rem		<b>C</b> <sup>3</sup> 100 rem	<b>C</b> <sup>3</sup> 100 rem	Cons	_				
M = Mitigative (reduces event consequences)	М	25.0 rem > <b>C</b> <sup>3</sup> 5 rem	10	00 rem <b>&gt; C</b> <sup>3</sup> 25 rem	100 rem > C <sup>3</sup> 25 rem		N	IV	IV	IV	IV
Acronyms	L	5 rem > <b>C</b>		25 rem <b>&gt; C</b>	25 rem > <b>C</b>						
MOI = Maximally-exposed Offsite Individual rem = Roentgen equivalent man	N	0.5 rem > <b>C</b>		5 rem <b>&gt; C</b>	5 rem <b>&gt; C</b>						

Table 12.2 Radiological – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Residual	Hazard: exposure to ionizing radiation	L: A	P – General and/or job specific RWP: A Radiological Work Permit is	L: BEU
Activation	beyond regulatory limits.	C: H	written by ES&H that specifies the work that is permitted to be	C: L
		R: I	<ul> <li>performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P – LSM: Monitors radiation levels during job</li> <li>P – Radiological Training: educates workers about radiological hazards, and general means and methods to reduce exposure.</li> <li>M – Radiological signage and cool off (decay) time requirements prior to entry</li> <li>M – Target pile shielding: attenuates radiation.</li> </ul>	R: IV
Groundwater	Hazard: radionuclides in ground water	L: A	See Section I Chapter 04	L: BEU
Activation	exceed regulatory levels	C: H		C: L
		R: I		R: IV
Surface Water	Hazard radionuclides in surface water	L: A	See Section I Chapter 04	L: BEU
Activation	exceed regulatory levels	C: H		C: L
		R: I		R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Radioactive	Hazard: persons are exposed, beyond	L: A	P – Active and automatic beam tuning is performed to limit beam	L: BEU
Water (RAW)	regulatory levels, to radioactive water	C: H	losses.	C: L
Systems		R: I	<ul> <li>P – Monitoring wells are sampled periodically to determine the levels if any detectable in the groundwater.</li> <li>P – Sump pump systems are engineered systems engineered to limit water radioactivation.</li> </ul>	R: IV
			M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.	
Air Activation	Hazard: radionuclides in air exceed	L: A	See Section I Chapter 04	L: EU
	regulatory levels	C: H	·	C: N
		R: I		R: IV
Soil Interactions	Hazard: radionuclides are produced	L: A	P – Active and automatic beam tuning is performed to limit beam	L: U
	which may contaminate ground water	C: N	losses.	C: N
		R: IV	<ul> <li>M – Beamline Design and Engineered Beam Dump: the beamline is designed that includes measures to reduce unwanted beam particle losses, as well as the use of a beam dump (absorber) design that minimizes radiological leakage through the use of shielding. This is a passive mitigation.</li> <li>M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.</li> <li>M – Past studies have characterized the migration of tritium into shielding and lessons have been applied.</li> </ul>	R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Radioactive	Hazard: persons are exposed to	L: A	P – General and/or Job Specific RWP: A Radiological Work Permit is	L: EU
Waste	ionizing radiation beyond regulatory	C: L	written by ES&H that specifies the work that is permitted to be	C: N
	levels	R: III	<ul> <li>performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P – Use Of an LSM: Use of a log survey monitor is specified by a RWP. The LSM allows for real time monitoring of radiation levels during work.</li> <li>M – Decay Time Requirements: Work may be restricted or prevented until sufficient time has passed such that radiation levels are sufficiently low to allow for safer work to proceed. This is an active mitigation.</li> <li>M – Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is an active mitigation.</li> </ul>	R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Contamination	Hazard: persons are exposed to ionizing radiation beyond regulatory levels	L: A C: H R: I	<ul> <li>P – Shielding for Activated Contamination: Shielding material prevents unintended exposure to sources and personnel.</li> <li>P – Radiological Surveying and Cleaning: RCTs and RSOs survey for and clean radiological contamination as part of the RWP process.</li> <li>P – General and/or Job Specific RWP: A Radiological Work Permit is written by ES&amp;H that specifies the work that is permitted to be performed, requirements to perform the work, and limitations of radiological exposure.</li> <li>P – Use Of an LSM: Use of a log survey monitor is specified by a RWP as necessary. The LSM allows for real time monitoring of radiation levels during work.</li> <li>M – Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is an active mitigation. Active mitigation by containing contaminated items to prevent release is used as necessary</li> <li>M – PPE: A RWP may specify that personal protective equipment be used during certain kinds of work or work conditions. The PPE limits the likelihood of bodily exposure to activated material and</li> </ul>	L: BEU C: L R: IV
<sup>7</sup> Be	Hazard: Potential radiation exposure to 7Be (uptake/committed dose).	L: A C: N R: IV	contamination. This is an active mitigation.  No prevention or mitigation is required. <sup>7</sup> Be isn't hazardous in this pattern of use by facility.	L: A C: N R: IV

Likelihood (L, of event)/year	Con	sequence (C, of event)/	year	Risk (R, Qualitative Ra	nking)	Risk Matrix					
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (even	it) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	nt) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (eve	= situation (event) of minor concern	ces	Н	I	1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible		IV = situation (event) of minimal concern		enc	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsit	e-2 (co-located worker)	Onsite-1 (facility worker)	nbə	1	Ш	III	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	<b>C</b> <sup>3</sup> 25.0 rem		<b>C</b> <sup>3</sup> 100 rem	<b>C</b> <sup>3</sup> 100 rem	Cons	_				
<b>M</b> = Mitigative (reduces event consequences)	М	25.0 rem > <b>C</b> <sup>3</sup> 5 rem	10	00 rem <b>&gt; C</b> <sup>3</sup> 25 rem	100 rem > C <sup>3</sup> 25 rem		N	IV	IV	IV	IV
Acronyms	L	5 rem > <b>C</b>		25 rem <b>&gt; C</b>	25 rem > <b>C</b>						
MOI = Maximally-exposed Offsite Individual rem = Roentgen equivalent man	N	0.5 rem > <b>C</b>		5 rem <b>&gt; C</b>	5 rem <b>&gt; C</b>						

Table 12.3 Radiological – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Residual	Hazard: exposure to ionizing radiation	L: BEU	P – Access to areas with this hazard are protected by on site access	L: BEU
Activation	beyond regulatory limits.	C: H	restrictions and restricted access to buildings	C: M
		R: III	<ul> <li>P – Access to the enclosure is further protected by interlocked keys.         These keys are not issued to members of the public. This prevents them from being exposed to residual activation.     </li> <li>P – Radiological Signage: Signs located in various places throughout the accelerator complex warn of various hazards and occupancy restrictions.</li> </ul>	R: IV
Groundwater	Hazard: radionuclides in ground water	L: A	See Section I Chapter 04	L: EU
Activation	exceed regulatory levels	C: H		C:M
		R: I		R: III
Surface Water	Hazard: radionuclides in surface water	L: A	See Section I Chapter 04	L: BEU
Activation	exceed regulatory levels	C: H		C: M
		R: I		R: IV

Hazard Hazard Description		Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Radioactive	Hazard: persons are exposed, beyond	L: BEU	P – RAW Key Control System: Multiple key systems prevent personnel	L: BEU
Water (RAW)	regulatory levels, to radioactive water	C: H	access to radioactive water systems.	C: M
Systems		R: III	<ul> <li>P – Secondary Containment is engineered containment that prevents unintended exposure to contaminated water.</li> <li>M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.</li> <li>M – RCT Or RSO Monitoring: A RWP will specify that a Radiation Control Technician or Radiation Safety Officer be present during certain kinds of work or work conditions. The radiological expert can make real time decisions to limit, stop, or prevent radiation exposure to</li> </ul>	R: IV
A. A. I. I.			personnel. This is an active mitigation.	I DELL
Air Activation	Hazard: radionuclides in air exceed	L: BEU	See Section I Chapter 04	L: BEU
	regulatory levels	C: H		C: M
		R: III		R: IV

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Soil Interactions	Hazard: radionuclides are produced	L: BEU	P – Active and automatic beam tuning is performed to limit beam losses.	L: BEU
	which may contaminate ground water	C: H R: III	<ul> <li>M – Beamline Design and Engineered Beam Dump: the beamline is designed that includes measures to reduce unwanted beam particle losses, as well as the use of a beam dump (absorber) design that minimizes radiological leakage through the use of shielding. This is a passive mitigation.</li> <li>M – Run Conditions: Operating parameters that reduce activation by limiting the total amount of beam that can be delivered are specified. Specifically, this includes an operating limit for protons/hr. This is an active mitigation and the systems that must be operational for running beam are spelled out.</li> <li>M – Past studies have characterized the migration of tritium into shielding and lessons have been applied.</li> </ul>	C: M R: IV
Radioactive Waste	Hazard: persons are exposed to ionizing radiation beyond regulatory levels	L: BEU C: H R: III	<ul> <li>P – Access to areas with this hazard are protected by on site access restrictions and restricted access to buildings.</li> <li>P – Radiological Signage: Signs located in various places throughout the accelerator complex warn of various hazards and occupancy restrictions.</li> <li>M – Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is</li> </ul>	L: BEU C: M R: IV

Hazard Hazard Description		Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Contamination	Hazard: persons are exposed to	L: BEU	P – Access to areas with this hazard are protected by on site access	L: BEU
	ionizing radiation beyond regulatory	C: H	restrictions and restricted access to buildings.	C: M
	levels	R: III	<ul> <li>P – Radiological Signage: Signs located in various places throughout the accelerator complex warn of various hazards and occupancy restrictions.</li> <li>P – Shielding for Activated Contamination: Shielding material prevents unintended exposure to sources and personnel.</li> <li>M – Material Survey and Release Process: Any item exposed to beam-on conditions is surveyed by radiological workers and classified appropriately when removed from an enclosure. Items identified for disposal are surveyed and processed by Radiological Control organization personnel in accordance with FRCM Chapter 4. This is an active mitigation. Active mitigation by containing contaminated items to prevent release is used as necessary.</li> </ul>	R: IV
<sup>7</sup> Be	Hazard: Potential radiation exposure	L: A	No prevention or mitigation is required. <sup>7</sup> Be isn't hazardous in this	L: A
	to 7Be (uptake/committed dose).	C: N	pattern of use by facility.	C: N
		R: IV		R: IV

Radiological Hazard Consequences, derived from Figure	C-1, '	Example Qualitative Cons	seque	ence Matrix", DOE-HDB	K-1163-2020.						
Likelihood (L, of event)/year	Cor	sequence (C, of event)/ye	ear	Risk (R, Qualitative Ra	nking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (even	t) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		<pre>II = situation (ever</pre>	nt) of concern		1	Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (eve	nt) of minor concern	es	Н	I	- 1	II	111
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (event) of minimal concern		ences	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsit	e-2 (co-located worker)	Onsite-1 (facility worker)	edn	ı	III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	<b>C</b> <sup>3</sup> 25.0 rem		<b>C</b> <sup>3</sup> 100 rem	<b>C</b> <sup>3</sup> 100 rem	Cons					
<b>M</b> = Mitigative (reduces event consequences)	М	25.0 rem > <b>C</b> <sup>3</sup> 5 rem	10	00 rem <b>&gt; C</b> <sup>3</sup> 25 rem	100 rem > C 3 25 rem		N	IV	IV	IV	IV
Acronyms	L	5 rem > <b>C</b>		25 rem > <b>C</b>	25 rem > <b>C</b>						
MOI = Maximally-exposed Offsite Individual rem = Roentgen equivalent man	N	0.5 rem > <b>C</b>		5 rem <b>&gt; C</b>	5 rem <b>&gt; C</b>						

Table 12.4 Toxic Materials – Onsite 1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Beryllium	Hazard: Beryllium beam windows may	L: U	P – Windows designed to be contained by consumable and replaceable	L: EU
	rupture and fragment.	C: L	components rather than released into the target hall.	C: N
		R: III	M – Engineered designs assure appropriate pressure differential across particle windows.	R: IV

Likelihood (L, of event)/year	Co	nsequence (C, of event),	/year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (eve	nt) of major concern				Likel	ihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	nces	Н	I	- 1	II	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	l o	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	-2 (co-located worker)	Onsite-1 (facility worker)	edn		III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	н	<b>C</b> <sup>3</sup> PAC-2		<b>C</b> <sup>3</sup> PAC-3	C 3 IDLH	Cons		""		1 V	1 V
<b>M</b> = Mitigative (reduces event consequences)	м	PAC-2 > <b>C</b> <sup>3</sup> PAC-1	F	PAC-3 > <b>C</b> <sup>3</sup> PAC-2	IDLH > C 3 PEL or TLVc		N	IV	IV	IV	IV
Acronyms	L	PAC-1 > <b>C</b>		PAC-2 > <b>C</b>	PEL or TLV <sub>c</sub> > C	1					
IDLH = Immediately Dangerous to Life and Health	N	Consequences less	Con	sequences less than	Consequences less than	1					
MOI = Maximally-exposed Offsite Individual		than those for Low		for Low Consequence	those for Low						
PAC = Protective Action Criteria		Consequence Level	tilose	Level	Consequence Level						
PEL = Permissible Exposure Limit		Consequence Level		revei	Consequence Level						
TLV <sub>c</sub> = Threshold Limit Value (ceiling)											

Table 12.5 Toxic Materials – Onsite 2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Beryllium	Hazard: Beryllium beam windows may	L: U	P – Windows designed to be contained by consumable and replaceable	L:EU
	rupture and fragment.	C: L	components rather than released into the target hall.	C: N
		R: III	M – Engineered designs assure appropriate pressure differential across particle windows.	R: IV

Likelihood (L, of event)/year	Co	nsequence (C, of event),	/year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (eve	I = situation (event) of major concern				Likel	ihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	II = situation (event) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	ces	Н	- 1	I	Ш	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	IV = situation (event) of minimal concern			П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	-2 (co-located worker)	Onsite-1 (facility worker)	edu	ı	Ш	III	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	<b>C</b> <sup>3</sup> PAC-2		<b>C</b> <sup>3</sup> PAC-3	C 3 IDLH	Cons					
<b>M</b> = Mitigative (reduces event consequences)	м	PAC-2 > <b>C</b> <sup>3</sup> PAC-1	F	PAC-3 > <b>C</b> <sup>3</sup> PAC-2	IDLH > C 3 PEL or TLVc		N	IV	IV	IV	IV
Acronyms	L	PAC-1 > <b>C</b>		PAC-2 > <b>C</b>	PEL or TLV <sub>c</sub> > <b>C</b>						
IDLH = Immediately Dangerous to Life and Health	N	Consequences less	Con	sequences less than	Consequences less than						
MOI = Maximally-exposed Offsite Individual		than those for Low		for Low Consequence	those for Low						
PAC = Protective Action Criteria		Consequence Level	tilose	Level	Consequence Level						
PEL = Permissible Exposure Limit		consequence Level		LCVCI	Consequence Level						
TLV <sub>c</sub> = Threshold Limit Value (ceiling)											

**Table 12.6 Toxic Materials – MOI Offsite** 

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Beryllium	Hazard: Potential exposure to beryllium dust during manual handling of un-encased, or machining dusts from fabrication shop activities.	L: BEU C:H R:III	P – The NuMI Area is beyond the public access gates P – Components are in beamline, thus inaccessible to public.	L: BEU C: H R: III

Likelihood (L, of event)/year	Co	nsequence (C, of event)	/year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (event) of major concern					Likel	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate		II = situation (eve	ent) of concern		1	Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	ces	Н	I	1	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	enc	М	Ш	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	e-2 (co-located worker)	Onsite-1 (facility worker)	nbəs		Ш	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	<b>C</b> <sup>3</sup> PAC-2		<b>C</b> <sup>3</sup> PAC-3	C 3 IDLH	Cons	-	""		10	
M = Mitigative (reduces event consequences)	м	PAC-2 > <b>C</b> <sup>3</sup> PAC-1	F	PAC-3 > <b>C</b> <sup>3</sup> PAC-2	IDLH > C 3 PEL or TLVc		N	IV	IV	IV	IV
Acronyms	L	PAC-1 > <b>C</b>		PAC-2 > <b>C</b>	PEL or TLV <sub>c</sub> > C						
IDLH = Immediately Dangerous to Life and Health	N	Consequences less	Con	seguences less than	Consequences less than	-					
MOI = Maximally-exposed Offsite Individual		than those for Low		for Low Consequence	those for Low						
PAC = Protective Action Criteria		Consequence Level	those	Level	Consequence Level						
PEL = Permissible Exposure Limit		consequence lever		LCVCI	consequence rever						
TLV <sub>c</sub> = Threshold Limit Value (ceiling)											

Table 12.7 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	Hazard:	L:	See Section I Chapter 04	L:
Materials (cables,		C:		C:
Boxes, Paper,		R:		R:
wood cribbing, etc.)				

Likelihood (L, of event)/year	Co	onsequence (C, of event)/y	ear	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (eve	nt) of major concern				Like	ihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	II = situation (event) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	ces	Н	- 1	_	П	111
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible			ent) of minimal concern	enc	М	П	Ξ	Ш	IV
Control(s) Type	С			-2 (co-located worker)	Onsite-1 (facility worker)	nbəs	ı	Ш	Ш	IV	IV
<ul> <li>P = Preventive (reduce event occurrence likelihood)</li> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	or i	rompt worker fatality acute injury that is immediately lifethreatening or manently disabling.	C <sup>3</sup> Prompt worker fatality or acute injury that is immediately life- threatening or permanently disabling.	Con	N	IV	IV	IV	IV
	M	C <sup>3</sup> Mild, transient adverse effects.  Mild, transient adverse effects > C	imm peri hosp	Serious injury, no dediate loss of life no manent disabilities; bitalization required.  Minor injuries; no ospitalization > C	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.  Minor injuries; no hospitalization > C						

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

Table 12.8 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		L:	See Section I Chapter 04	L:
Materials (cables,		C:		C:
Boxes, Paper,		R:		R:
wood cribbing,				
etc.)				

Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (event) of major concern					Like	ihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	ces	Н	- 1	-	II	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible		IV = situation (ev	IV = situation (event) of minimal concern		М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	-2 (co-located worker)	Onsite-1 (facility worker)	sedu	ı	Ш	Ш	IV	IV
<ul> <li>P = Preventive (reduce event occurrence likelihood)</li> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or symptoms which could impair an	or	rompt worker fatality acute injury that is immediately life- threatening or	C <sup>3</sup> Prompt worker fatality or acute injury that is immediately life- threatening or	Con	N	IV	IV	IV	IV
		individual's ability to take protective action.	•	manently disabling.	permanently disabling.						
	М	C <sup>3</sup> Mild, transient adverse effects.	imm per	<sup>3</sup> Serious injury, no nediate loss of life no manent disabilities; pitalization required.	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						

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

Table 12.9 Flammable and Combustible Materials – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Combustible		L:	See Section I Chapter 04	L:
Materials (cables,		C:		C:
Boxes, Paper,		R:		R:
wood cribbing,				
etc.)				

Likelihood (L, of event)/year	Co	onsequence (C, of event),	/year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (event) of major concern					Like	ihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	III = situation (event) of minor concern		Н	- 1	- 1	II	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	IV = situation (event) of minimal concern		М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	e-2 (co-located worker)	Onsite-1 (facility worker)	nbə	1	Ш	Ш	IV	IV
P = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	<b>C</b> <sup>3</sup> P	rompt worker fatality	C <sup>3</sup> Prompt worker fatality	Cons	N	IV	IV	IV	IV
<b>M</b> = Mitigative (reduces event consequences)		serious effects, or	or	acute injury that is	or acute injury that is						
Acronyms		symptoms which	i	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an		threatening or	threatening or						
		individual's ability to	per	manently disabling.	permanently disabling.						
		take protective									
		action.									
	М	C <sup>3</sup> Mild, transient	C	<sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	imm	nediate loss of life no	immediate loss of life no						

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

Table 12.10 Electrical Energy – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Stored Energy		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
High Voltage		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
Low Voltage, High		L:	See Section I Chapter 04	L:
Current Exposure.		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "	Exar	nple Qualitative Conseque	ence Matrix", DOE-HDBK-116	3-2020.						
Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (ever	I = situation (event) of major concern				Likelihood		
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situation (eve	II = situation (event) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III = situation (ev	III = situation (event) of minor concern		Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible	IV = situation (ev	ent) of minimal concern	iences	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	Consequ	ı	III	III	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Sons					
<b>M</b> = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.11 Electrical Energy 1 Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Stored Energy		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
High Voltage		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
Low Voltage, High		L:	See Section I Chapter 04	L:
Current Exposure.		C:		C:
		R:		R:

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

Table 12.12 Electrical Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Stored Energy		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
High Voltage		L:	See Section I Chapter 04	L:
Exposure		C:		C:
		R:		R:
Low Voltage, High		L:	See Section I Chapter 04	L:
Current Exposure.		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate	II = situation (eve	ent) of concern		1	Α	U	EU	BEI
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low	III = situation (ev	ent) of minor concern	es	Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible	IV = situation (ev	vent) of minimal concern	ences	М	П	Ш	Ш	١٧
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	Conseque		111	Ш	IV	١٧
<b>P</b> = Preventive (reduce event occurrence likelihood)	н	C <sup>3</sup> Irreversible, other C <sup>3</sup> Prompt worker fatality		C <sup>3</sup> Prompt worker fatality	ons		""		IV	
M = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is	O	N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.13 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	nsequence (C, of event)/	year Risk (R, Qualitative R	Ranking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	ent) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate	II = situation (ev			1	Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low	III = situation (ev	vent) of minor concern	s	Н	- 1	- 1	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible	IV = situation (ev	vent) of minimal concern	enc	М	П	П	111	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	edn		Ш	III	IV	IV
P = Preventive (reduce event occurrence likelihood)		C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Consequences	N				IV
<b>M</b> = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		IN	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.14 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	nsequence (C, of event)/y	year	Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (ever	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate		II = situation (eve	ent) of concern		1	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	es	Н	I	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	enc	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2	(co-located worker)	ker) Onsite-1 (facility worker)			Ш	Ш	IV	IV
<ul> <li>P = Preventive (reduce event occurrence likelihood)</li> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>	Н	, and the second		ompt worker fatality	C <sup>3</sup> Prompt worker fatality	Consequences	N	IV	IV	IV	IV
		serious effects, or symptoms which could impair an individual's ability to take protective action.	im t	cute injury that is nmediately life- hreatening or nanently disabling.	or acute injury that is immediately life-threatening or permanently disabling.						
	М	C <sup>3</sup> Mild, transient adverse effects.	imme perm	Serious injury, no diate loss of life no nanent disabilities; talization required.	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						
	L	Mild, transient adverse effects > <b>C</b>		inor injuries; no spitalization > C	Minor injuries; no hospitalization > C						
	N	Consequences less		equences less than	Consequences less than	-					
		•		or Low Consequence	those for Low						
		Consequence Level		Level	Consequence Level						

Table 12.15 Thermal Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Hot Work		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/y	year Risk (R, Qualitative R	tanking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	ent) of major concern				Like	lihood	1
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situation (ev	ent) of concern		Į.	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low	III = situation (ev	vent) of minor concern	ces	Н	I	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible	IV = situation (ev	vent) of minimal concern	e l	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI) Onsite-2 (co-located worker) Onsite-1 (facility worker)		sedn	_	III	III	IV	IV	
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or	C <sup>3</sup> Prompt worker fatality or acute injury that is	C <sup>3</sup> Prompt worker fatality or acute injury that is	Cons	N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	M	C 3 Mild, transient	C 3 Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.16 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		L:	See Section I Chapter 04	L:
1011011		C:		C:
		R:		R:
Pumps and		L:	See Section I Chapter 04	L:
Motors		C:		C:
		R:		R:
Motion Tables		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

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

Table 12.17 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		L:	See Section I Chapter 04	L:
1 OWEI 10013		C:		C:
		R:		R:
Pumps and		L:	See Section I Chapter 04	L:
Motors		C:		C:
		R:		R:
Motion Tables		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.														
Likelihood (L, of event)/year	Co	Consequence (C, of event)/year Risk (R, Qualitative Ranking)						Risk Matrix_						
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (ever	nt) of major concern				Like	lihood				
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern		ı	Α	U	EU	BEU			
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		L = Low		III = situation (ev	ent) of minor concern	ces	Н	I	- 1	П	Ш			
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible		IV = situation (ev	ent) of minimal concern	e l	М	П	H	Ш	IV			
Control(s) Type	С	Offsite (MOI)	Onsite	e-2 (co-located worker)	Onsite-1 (facility worker)	sedn	L	III	III	IV	IV			
<ul> <li>P = Preventive (reduce event occurrence likelihood)</li> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	or i	rompt worker fatality acute injury that is immediately life- threatening or manently disabling.	C <sup>3</sup> Prompt worker fatality or acute injury that is immediately life- threatening or permanently disabling.	Conse	N	IV	IV	IV	IV			
	M	C <sup>3</sup> Mild, transient adverse effects.  Mild, transient adverse effects > C	imm per hosp	Serious injury, no nediate loss of life no manent disabilities; pitalization required.  Winor injuries; no nospitalization > C	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.  Minor injuries; no hospitalization > C									

Table 12.18 Kinetic Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Power tools		L:	See Section I Chapter 04	L:
1 OWEI 10013		C:		C:
		R:		R:
Pumps and		L:	See Section I Chapter 04	L:
Motors		C:		C:
		R:		R:
Motion Tables		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "Example Qualitative Consequence Matrix", DOE-HDBK-1163-2020.											
Likelihood (L, of event)/year	Co	onsequence (C, of event)/	anking)	Risk Matrix							
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (ever	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern		ı	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	ces	Н	I	- 1	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		N = Negligible		IV = situation (ev	ent) of minimal concern	e l	М	П	H	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite	e-2 (co-located worker)	Onsite-1 (facility worker)	sedn	L	III	III	IV	IV
<ul> <li>P = Preventive (reduce event occurrence likelihood)</li> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or symptoms which could impair an individual's ability to take protective action.	or i	rompt worker fatality acute injury that is immediately life- threatening or manently disabling.	C <sup>3</sup> Prompt worker fatality or acute injury that is immediately life- threatening or permanently disabling.	Con	N	IV	IV	IV	IV
	M	C <sup>3</sup> Mild, transient adverse effects.  Mild, transient adverse effects > C	imm per hosp	Serious injury, no nediate loss of life no manent disabilities; pitalization required.  Winor injuries; no nospitalization > C	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.  Minor injuries; no hospitalization > C						

Table 12.19 Potential Energy – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Crane		L:		L:
Operations		C:	See Section I Chapter 04	C:
		R:		R:
Compressed		L:		L:
Gasses		C:	See Section I Chapter 04	C:
		R:		R:
Vacuum Pumps		L:		L:
		C:	See Section I Chapter 04	C:
		R:		R:
Material		L:		L:
Handling		C:	See Section I Chapter 04	C:
		R:		R:

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

Table 12.20 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Compressed		L:	See Section I Chapter 04	L:
Gasses		C:		C:
		R:		R:
Vacuum Pumps		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Material Handling		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

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

Table 12.21 Potential Energy – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Crane Operations		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Compressed		L:	See Section I Chapter 04	L:
Gasses		C:		C:
		R:		R:
Vacuum Pumps		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Material Handling		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "	Exar	mple Qualitative Conseque	ence Matrix", DOE-HDBK-116	53-2020.						
Likelihood (L, of event)/year	C	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix	I			
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situation (eve	ent) of concern		1	Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III = situation (ev	ent) of minor concern	ces	Н	- 1	I	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situation (ev	ent) of minimal concern	e l	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	sedn	ı	III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Cons					
M = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.22 Magnetic Fields – Onsite-1 Facility Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Fringe Fields		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risl	k (R, Qualitative R	anking)	Risk I	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (eve	nt) of major concern				Like	lihood	,
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	es	Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	enc	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co	o-located worker)	Onsite-1 (facility worker)	edn		Ш	Ш	IV	IV
P = Preventive (reduce event occurrence likelihood)  M = Mitigative (reduces event consequences)	Н	C <sup>3</sup> Irreversible, other		ot worker fatality	C <sup>3</sup> Prompt worker fatality	Consequences	N	IV	IV	IV	IV
<ul> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>		serious effects, or symptoms which could impair an individual's ability to take protective action.	imme thre	e injury that is ediately life- eatening or ently disabling.	or acute injury that is immediately life- threatening or permanently disabling.						
	Ν	C <sup>3</sup> Mild, transient adverse effects.	immediat permane	ious injury, no te loss of life no ent disabilities; zation required.	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						
	L	Mild, transient	Minor	r injuries; no	Minor injuries; no						
		adverse effects > C	hospit	talization > C	hospitalization > C						
	N	Consequences less	Consequ	ences less than	Consequences less than						
		than those for Low	those for L	ow Consequence	those for Low						
		Consequence Level		Level	Consequence Level						

Table 12.23 Magnetic Fields – Onsite-2 Co-located Worker

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Fringe Fields		L: C: R:	See Section I Chapter 04	L: C: R:

Likelihood (L, of event)/year	C	onsequence (C, of event)/	year Risk (R, (	Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = s	ituation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	H = :	II = situation (event) of concern			I	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III =	situation (ev	ent) of minor concern	Jces	Н	I	I	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV =	situation (ev	ent) of minimal concern	enc	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-locat	ed worker)	Onsite-1 (facility worker)	sedn	ı	Ш	Ш	IV	IV
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or	C <sup>3</sup> Prompt wor	•	C <sup>3</sup> Prompt worker fatality or acute injury that is	Cons	N	IV	IV	IV	IV
M = Mitigative (reduces event consequences)  Acronyms  MOI = Maximally-exposed Offsite Individual		symptoms which could impair an individual's ability to	immediate threateni	ely life- ng or	immediately life- threatening or						
		take protective action.	реппапения	uisabiiiig.	permanently disabling.						
	М	C <sup>3</sup> Mild, transient	<b>C</b> <sup>3</sup> Serious ir	njury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss	s of life no	immediate loss of life no						
			permanent di	sabilities;	permanent disabilities;						
			hospitalization	required.	hospitalization required.						
	L	Mild, transient	Minor injur	ies; no	Minor injuries; no						
		adverse effects > C	hospitalizat	tion > C	hospitalization > C						
	N	Consequences less	Consequences	less than	Consequences less than						
		than those for Low	those for Low Co	onsequence	those for Low						
		Consequence Level	Leve	I	Consequence Level						

Table 12.24 Magnetic Fields – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Fringe Fields		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/y	year Ris	k (R, Qualitative R	anking)	Risk I	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (ever	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	es	Н	I	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	enc	M	Ш	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co	o-located worker)	Onsite-1 (facility worker)	edn	1	Ш	Ш	IV	IV
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or		ot worker fatality e injury that is	C <sup>3</sup> Prompt worker fatality or acute injury that is	Consequences	N	IV	IV	IV	IV
Acronyms  MOI = Maximally-exposed Offsite Individual		symptoms which could impair an individual's ability to take protective action.	imme thre	ediately life- eatening or ently disabling.	immediately life- threatening or permanently disabling.						
	М	C <sup>3</sup> Mild, transient adverse effects.	immedia perman	ious injury, no te loss of life no ent disabilities; zation required.	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						
	L	Mild, transient adverse effects > <b>C</b>		r injuries; no talization > <b>C</b>	Minor injuries; no hospitalization > C						
	N	Consequences less		iences less than	Consequences less than						
		•		ow Consequence	those for Low						
		Consequence Level		Level	Consequence Level						

Table 12.25 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Noise		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Ergonomics		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "	Exar	mple Qualitative Conseque	ence Matrix", DOE-HDBK-116	53-2020.						
Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix	I			
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate	II = situation (eve	ent) of concern		ı	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III = situation (ev	ent) of minor concern	ces	Н	- 1	I	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situation (ev	ent) of minimal concern	e l	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	sedn	ı	III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Cons					
M = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.26 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Noise		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Ergonomics		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "	Exar	nple Qualitative Conseque	ence Matrix", DOE-HDBK-116	53-2020.						
Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix	I			
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situation (eve	II = situation (event) of concern			Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III = situation (ev	ent) of minor concern	es	Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situation (ev	ent) of minimal concern	ences	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	sedn	ı	III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Cons	_				
M = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.27 Other hazards – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Confined Spaces	Hazard:	L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Noise	Hazard:	L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:
Ergonomics	Hazard:	L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Other Hazard Consequences, derived from Figure C-1, "	Exar	mple Qualitative Conseque	ence Matrix", DOE-HDBK-116	53-2020.						
Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualitative R	anking)	Risk	Matrix	I			
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (eve	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		<b>M</b> = Moderate	II = situation (eve	situation (event) of concern		ı	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		$\mathbf{L} = Low$	III = situation (ev	ent) of minor concern	ces	Н	- 1	I	П	III
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situation (ev	ent) of minimal concern	e l	М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	sedn	ı	III	Ш	IV	IV
<b>P</b> = Preventive (reduce event occurrence likelihood)	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fatality	C <sup>3</sup> Prompt worker fatality	Cons					
M = Mitigative (reduces event consequences)		serious effects, or	or acute injury that is	or acute injury that is		N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	М	C <sup>3</sup> Mild, transient	C <sup>3</sup> Serious injury, no	C <sup>3</sup> Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

Table 12.28 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		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risl	k (R, Qualitative R	anking)	Risk I	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High		I = situation (eve	nt) of major concern				Like	lihood	,
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate		II = situation (eve	ent) of concern			Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low		III = situation (ev	ent) of minor concern	es	Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible		IV = situation (ev	ent) of minimal concern	enc	М	П	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co	o-located worker)	Onsite-1 (facility worker)	edn		Ш	Ш	IV	IV
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other		ot worker fatality	C <sup>3</sup> Prompt worker fatality	Consequences	N	IV	IV	IV	IV
<ul> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>		serious effects, or symptoms which could impair an individual's ability to take protective action.	imme thre	e injury that is ediately life- eatening or ently disabling.	or acute injury that is immediately life- threatening or permanently disabling.						
	Ν	C <sup>3</sup> Mild, transient adverse effects.	immediat permane	ious injury, no te loss of life no ent disabilities; zation required.	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						
	L	Mild, transient	Minor	r injuries; no	Minor injuries; no						
		adverse effects > C	hospit	talization > C	hospitalization > C						
	N	Consequences less	Consequ	ences less than	Consequences less than						
		than those for Low	those for L	ow Consequence	those for Low						
		Consequence Level		Level	Consequence Level						

Table 12.29 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		L:		L:
		C:	See Section I Chapter 04	C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/	year Risk (R, Qualit	ative Ra	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situatio	on (even	nt) of major concern				Like	lihood	,
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situat	ion (eve	ent) of concern		I	Α	U	EU	BEU
<b>EU</b> = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low	III = situat	tion (eve	ent) of minor concern	es	Н	I	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situa	tion (eve	ent) of minimal concern	enc	М	Ш	П	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located wo	rker)	Onsite-1 (facility worker)	edn		Ш	Ш	IV	IV
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other	C <sup>3</sup> Prompt worker fa	,	C <sup>3</sup> Prompt worker fatality	Consequences	N	IV	IV	IV	IV
<ul> <li>M = Mitigative (reduces event consequences)</li> <li>Acronyms</li> <li>MOI = Maximally-exposed Offsite Individual</li> </ul>		serious effects, or symptoms which could impair an individual's ability to take protective action.	or acute injury tha immediately life threatening or permanently disabl	·-	or acute injury that is immediately life- threatening or permanently disabling.						
	Ν	C <sup>3</sup> Mild, transient adverse effects.	C <sup>3</sup> Serious injury, immediate loss of lif permanent disabilit hospitalization requ	fe no ties;	C <sup>3</sup> Serious injury, no immediate loss of life no permanent disabilities; hospitalization required.						
	L	Mild, transient	Minor injuries; n	0	Minor injuries; no						
		adverse effects > C	hospitalization >	С	hospitalization > C						
	N	Consequences less	Consequences less t	than	Consequences less than						
		than those for Low	those for Low Conseq	uence	those for Low						
		Consequence Level	Level		Consequence Level						

Table 12.30 Access & Egress – MOI Offsite

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Life Safety Egress		L:	See Section I Chapter 04	L:
		C:		C:
		R:		R:

Likelihood (L, of event)/year	Co	onsequence (C, of event)/y	year Risk (R, Qualitative R	anking)	Risk	Matrix				
A = Anticipated (L > 1.0E-02)		<b>H</b> = High	I = situation (ever	nt) of major concern				Like	lihood	
<b>U</b> = Unlikely (1.0E-02> L >1.0E-04)		M = Moderate	II = situation (eve	ent) of concern	l	Į.	Α	U	EU	BEU
EU = Extremely Unlikely (1.0E-04 > L >1.0E-06)		<b>L</b> = Low	III = situation (ev	ent) of minor concern	ces	Н	- 1	- 1	П	Ш
BEU = Beyond Extremely Unlikely (1.0E-06> L)		<b>N</b> = Negligible	IV = situation (ev	IV = situation (event) of minimal concern		М	П	Ш	Ш	IV
Control(s) Type	С	Offsite (MOI)	Onsite-2 (co-located worker)	Onsite-1 (facility worker)	sedn	-	Ш	III	IV	IV
<ul><li>P = Preventive (reduce event occurrence likelihood)</li><li>M = Mitigative (reduces event consequences)</li></ul>	Н	C <sup>3</sup> Irreversible, other serious effects, or	C <sup>3</sup> Prompt worker fatality or acute injury that is	C <sup>3</sup> Prompt worker fatality or acute injury that is	Cons	N	IV	IV	IV	IV
Acronyms		symptoms which	immediately life-	immediately life-						
MOI = Maximally-exposed Offsite Individual		could impair an	threatening or	threatening or						
		individual's ability to	permanently disabling.	permanently disabling.						
		take protective								
		action.								
	M	C 3 Mild, transient	C 3 Serious injury, no	C 3 Serious injury, no						
		adverse effects.	immediate loss of life no	immediate loss of life no						
			permanent disabilities;	permanent disabilities;						
			hospitalization required.	hospitalization required.						
	L	Mild, transient	Minor injuries; no	Minor injuries; no						
		adverse effects > C	hospitalization > C	hospitalization > C						
	N	Consequences less	Consequences less than	Consequences less than						
		than those for Low	those for Low Consequence	those for Low						
		Consequence Level	Level	Consequence Level						

**Table 12.31 Environmental** 

Hazard	Hazard Description	Baseline Qualitative Risk (without controls)	Preventative (P)/ Mitigative (M)	Residual Qualitative Risk (with controls)
Airborne	Hazards:	L:		L:
	Airborne release of radionuclides	C:	See Section I Chapter 04	C:
	beyond permitted limits.	R:		R:
	Discharge of chemicals into onsite		See Section I Chapter 04	
	surface waters beyond permitted limits.			
Water	Hazards:	L:		L:
	Discharge of radionuclides into	C:	See Section I Chapter 04	C:
	onsite surface waters beyond	R:		R:
	permitted limits.			
	Discharge of chemicals into onsite surface waters beyond permitted limits.		See Section I Chapter 04	
Soil	Hazards:	L:		L:
	Radioactive soil in beam loss areas	C:	See Section I Chapter 04	C:
	beyond allowable concentrations of	R:		R:
	radionuclides beyond calculated			
	Fermilab limits.			
	Discharge of chemicals into onsite soils beyond permitted limits.		See Section I Chapter 04	