

Name(s) of Risk Team Members: D. Beavis, P. Cirmigliaro		Point Value → Parameter ↓	1	2	3	4	5				
Area/Facility Description Title: Collider-Accelerator		Occupancy or Use (A)	≤once/year	≤once/month	≤once/week	≤once/shift	>once/shift				
Area/Facility # (if applicable): Area-Wide FRA 15-08											
Area/Facility Description: Intersecting Region at 2 o'clock position at RHIC		Severity (B)	First Aid Only	Medical Treatment	Lost Time	Partial Disability	Death or Permanent Disability				
		Likelihood (C)	Extremely Unlikely	Unlikely	Possible	Probable	Multiple				
Approved by: <i>E. Lessard</i> Date 3-3-08 Rev.#: 0							Comments:				
Reason for Revision (if applicable):											
			Risk with Controls in Place				Risk with Additional Controls in Place				
Physical Item or Activity	Hazard(s)	Control(s)	Risk with Controls in Place				Risk with Additional Controls in Place				% Risk Reduction
			Occupancy A	Severity B	Likelihood C	Risk* AxBxC	Occupancy A	Severity B	Likelihood C	Risk* AxBxC	
Primary Beam	High hazard ionizing radiation	PASS; postings; crash buttons and chords; C-AD area classification; shielding; dosimeters; training; RSC reviews, RCD oversight.	1	5	1	5					
General Area Radiation, Residual Radiation, External Radiation	Ionizing radiation	Postings, training, shielding, RCD surveys, RCD oversight, dosimetry, work planning	4	1	1	4					
Electrical Equipment & Power Supplies <250 VAC; <1000Vdc	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; energized electrical work permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	3	2	30					

Electrical Equipment & Power Supplies <600 VAC; <6000 VDC	Arc blast; burn	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working on or near energized conductors permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for energized electrical work. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	3	4	2	24						
Electrical Disconnects And Switches	Arc blast; burn	Procedures, training, PPE. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	2	4	2	16						
Electrical Disconnects And Switches	Shock or electrocution	Procedures, training, PPE. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	2	5	3	30						
Motor Control Centers; Panels And Wall Sockets	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; energized electrical work permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	4	2	32						
Motor Control Centers; Panels And Wall Sockets	Arc blast; burn	PPE; training; procedures. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	3	2	24						

Extension Chords; Temporary Wiring And Power Strips	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; qualified electricians and technicians; GFCI; grounding standards. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	3	2	24						
Vacuum	Ear damage	Postings; PPE; maintenance; training; work planning; ASSRC/ESRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; use of industry standards; design reviews	3	4	1	12						
Vacuum	Being struck by an object such as flying debris	Postings; PPE; maintenance; training; work planning; ASSRC/ESRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; use of industry standards; design reviews	3	4	1	12						
Magnetic Field	Adverse mechanical force exerted on ferromagnetic objects and or to electronic/medical implants.	Barriers; warning systems; postings; training ;ASSRC/ ESRC review; work planning; procedures; Tier 1 inspections; magnetic safety reviews; medical exams	1	4	2	8						
Flammable /Explosive Gases	Fire, Smoke and Heat	Fire detection & suppression systems; procedures; training; equipment protective systems; ASSRC/ESRC reviews; Fire Hazards Analysis; Tier 1 inspections; maintenance; emergency procedures; BNL Fire Rescue; ASE requirements; volume controls; segregation controls; labeling; area posting; gas detection interlock systems; warning alarm/yellow strobe	2	4	2	16						
Gasses	Oxygen deficiency	ODH analyses; ODH controls; training; remote/local audible/visible alarms; emergency response; work planning; MSDS; LOTO; postings; flammable gas alarms; cylinder storage controls; cylinder labels; gas volume limits; inspections; cylinder hydrostatic testing	4	5	2	40						
Lighting	Being struck against an object, such as a carpenter walking into a door frame due to poor lighting	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	3	2	3	18						
Lighting	Falls on same level	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	3	3	3	27						
Lighting	Being struck by an object due to a material handling mishaps	Tier 1 inspections; maintenance; emergency lighting; temporary lighting	2	3	3	18						

Material Handling Equipment	Falls to lower level, such as falling from a ladder or over a railing	Training, work planning, inspections, independent PE inspections and approval of equipment, fall protection training, approved scaffolding and platforms, approved fall protection harnesses, Tier 1 inspections, PPE, PE maintenance	3	4	3	36					
Material Handling Equipment	Becoming caught in or compressed by equipment	Training, work planning, inspections, Tier 1 inspections, PPE	3	4	3	36					
Material Handling	Being struck by an object due to improperly secured material; loss of control	Work planning; equipment specific training; work area barricades and controls; PPE; clamps; straps; vices; fixtures	3	3	3	27					
Chemical Handling	Eye exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	4	2	24					
Chemicals	Inhalation exposure	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	3	1	9					
Chemicals	Fire; explosions	Procedures; compliance with regulations; training; CMS inventory; MSDS; volume controls; PPE as required; locked or controlled areas; postings; labeling; proper containers; segregation; proper spill cleanup equipment available; Tier 1 inspections	3	2	1	12					
Manual Material Handling	Bodily reaction – injuries resulting from bending, climbing, loss of balance and slipping without falling	Gloves; hardhat; handcarts; dollies; training; safety shoes	4	3	3	36					
Remotely Operated Equipment	Becoming caught in or compressed by equipment	Postings; barriers; guards; maintenance; training; work planning; procedures; Tier 1 inspections; ASSRC reviews	2	4	3	24					
Use Of Hand Tools	Being struck by an object, such as flying chips	PPE; training; maintenance; Tier 1 inspections; UL listed equipment; pre-inspections	4	2	3	24					
Use Of Hand Tools	Being struck against an object, such as a sharp surface	PPE; training; guarding	4	2	3	24					
Use Of Hand Tools	Becoming caught in or compressed by equipment	Equipment specific training; guarding; PPE; postings	4	2	3	24					
Use Of Hand Tools	Becoming caught in or compressed by equipment	Equipment specific training; guarding; PPE; postings	4	2	3	24					

Electrical Powered Hand Tools	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; procedures; training; labeling; work planning; GFCI; grounding standards; double insulation. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	3	2	24					
Electrical Powered Hand Tools/ Machining Materials	Becoming caught in or compressed by equipment	Equipment specific training; authorized users; machine guards; PPE; postings; maintenance; Tier 1 inspections	2	3	3	18					
Electrical Powered Hand Tools/ Machining Materials	Being struck by an object, such as flying chips	Equipment specific training; authorized users; machine guards; PPE; postings; maintenance; Tier 1 inspections	2	3	3	18					
Electrical Powered Hand Tools/ Machining Materials	Non-rad airborne particulates	PPE; ventilation; maintenance; work planning	2	1	2	4					
Work At Heights	Falls to lower level, such as falling from a ladder or over a railing	Postings; barriers; fall protection; maintenance; training; work planning; procedures; Tier 1 inspections; PPE; approved scaffolding and platforms; approved ladders; anti-slip surfaces	2	5	3	30					
Working Environment	Poor air quality; mold	HVAC; facility maintenance; Tier 1 inspections	5	2	1	10					
Water	Being struck by an object due to a pressure release	Postings; maintenance; PPE; training; work planning; ASSRC review; procedures; Tier 1 inspections; PLC monitoring and interlocks	4	1	3	12					
Water	Contact with temperature – extremes that result in such injuries as heat exhaustion, frost bite or burns	Postings; maintenance; PPE; training; work planning; ASSRC review; procedures; Tier 1 inspections	4	3	2	24					
Tours	Internal or external radiation	Postings; trained escorts; RCD concurrence to enter radiation areas; RWP; work planning; training waiver; red TLD; BNL minors policy	3	1	1	3					
Transformer And Switch Yards	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; installations comply with applicable codes; procedures; training; LOTO; qualified electricians; postings; locked areas; work planning; grounding standards; emergency procedures; grounding before work start. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	2	4	2	16					

Transformer And Switch Yards	Arc blast	PPE; procedures; training; qualified electricians. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	2	4	2	16					
Standby Generators	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; energized electrical work permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards; emergency procedures, two-person rule for energized electrical work. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	2	4	2	16					
Standby Generators	Noise	Hearing protection	2	4	1	8					
Radioactive Sources	Internal or external radiation	Training; BNL and C-AD source custodians; source inventory; shielding; locked boxes; leak checks; posting; dosimeters; Chipmunk calibration procedures; locked cage for Chipmunk source	2	1	1	2					
Pressurized Systems	Being struck by an object due to a pressure release	Postings; PPE; maintenance; training; work planning; ESRC reviews; procedures; interlock systems; certification/testing of pressure related equipment; Tier 1 inspections; LOTO; C-AD Chief ME reviews; codes and standards usage	2	2	2	8					
Noise	Hearing loss	Training; hearing protection; noise surveys; procedures; postings; medicals; engineered noise reduction; work planning; locked areas with limited access to authorized personnel only	2	4	2	16					
Egress	Impaired egress	Tier 1; work planning; worker planned work; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; internal processes; lessons learned; life safety codes; emergency preparedness	5	3	3	45					
Cryogenic	Being struck by an object due to a pressure release	Postings; maintenance; training; work planning; LOTO; Cryogenic Safety Committee /ASSRC reviews; procedures; PPE; interlock systems; Tier one inspection; pressure testing	4	2	2	16					
Cryogenic	Contact with temperature – extremes that result in such injuries as frost bite or burns	Postings; maintenance; training; work planning; LOTO; Cryogenic Safety Committee /ASSRC reviews; procedures; PPE; interlock systems; Tier 1 inspection	4	3	2	24					

Cryogenic Systems	Oxygen deficiency	ODH analysis; ODH exhaust fans; training; remote/local audible/visible alarms; Fire/Rescue group response; Cryo-systems designed to consensus codes; procedures; work planning; LOTO; inspections; PPE as required; postings and labeling; Cryogenics Safety Committee/ASSRC reviews.	1	3	2	6					
Confined Spaces	Becoming caught in or compressed by equipment	Barriers; postings; training; Confined Spaces Permits; work planning; procedures; Tier 1 inspections	1	2	3	6					
Confined Spaces	Oxygen deficiency	Training; atmospheric testing before entry and periodically; entry procedures; Permits; work planning; LOTO; respirators; forced ventilation; personnel rescue equipment; emergency planning	1	5	2	10					
Confined Spaces	Increased chance of shock due of proximity to conducting surfaces	All equipment is listed or reviewed by CEE; work planning; grounding standards; GFCI	1	3	2	6					
Computer And Office Machine Usage	Repetitive motion resulting in muscular-skeletal injury	BNL SHSD ergonomic reviews; training; use of ergonomically designed equipment	2	3	2	12					
Batteries/UPS	Molten spray	PPE; procedures; training	4	2	1	8					
Batteries/UPS	Chemical burn	PPE; procedures; training.	3	2	2	12					
Batteries/UPS	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; energized electrical work permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; guarding; work planning; grounding standards; emergency procedures. C-AD management has implemented requirements and mechanisms to meet PPE requirements identified in NFPA 70E as of December 22, 2004. Enhanced PPE requirements established April 2006. Implementation of a plan to meet OSHA's NRTL requirements began June 1, 2005.	4	3	2	24					
Limited Access Areas	Impaired egress	Tier 1; work planning; skill of craft; training; barriers;	2	1	3	6					
Lasers	Eye damage	Barriers; interlock systems; postings; training; LSO review; work planning; PPE; procedures; Tier 1 inspections; warning systems	1	4	3	12					

Further Description of Controls Added to Reduce Risk:

*Risk:	0 to 20	21 to 40	41-60	61 to 80	81 or greater
	Negligible	Acceptable	Moderate	Substantial	Intolerable