

Name(s) of Risk Team Members: J. Scott, D. Phillips, Kin Yip	Point Value → Parameter ↓	1	2	3	4	5
Area/Facility Description Title: Collider-Accelerator Area/Facility # (if applicable): Area-Wide FRA 14-07	Occupancy or Use	≤once/year	≤once/month	≤once/week	≤once/shift	>once/shift
Area/Facility Description: IR-10 Area-Wide	Severity	First Aid Only	Medical Treatment	Lost Time	Partial Disability	Death or Permanent Disability
	Likelihood	Extremely Unlikely	Unlikely	Possible	Probable	Multiple
Approved by: <i>E. Lessard</i> Date: 1/23/07      Rev.#: 0						

Reason for Revision (if applicable):	Comments:
--------------------------------------	-----------

Physical Item or Activity	Hazard(s)	Control(s)	Before Additional Controls				Control(s) Added to Reduce Risk	After Additional Controls				% Risk Reduction
			Occupancy A	Severity B	Likelihood C	Risk* AxBxC		Occupancy A	Severity B	Likelihood C	Risk* AxBxC	
Primary Beam	High hazard ionizing radiation	ACS; PASS; postings; crash buttons and chords; C-AD area classification; shielding; dosimeters; training; RSC reviews, FS support, RWP	1	5	2	10						
General Area Radiation Residual Radiation, External Radiation	Ionizing radiation	Postings, training, shielding, RCD surveys, RCD oversight, RWP, work planning, procedures, dosimetry	4	1	2	8						
Electrical Equipment & Power Supplies BNL Class A & B <250 V AC; <1000V DC	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; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures. Compliance with SBMS "Electrical Safety" for work and PPE requirements.	5	3	2	30						
Electrical Equipment & Power Supplies BNL Class C <600 V AC; <6000 V DC	Arc blast; burn	Procedures, training, PPE, all equipment is listed or reviewed by CEE, tier 1 inspections, disconnected cable policy, installations comply with applicable codes, distribution drawings, LOTO, Kirk keys, working hot permits, work planning, GFCI, grounding standards, emergency procedures and emergency response, qualified electricians and technicians, cabinet interlocks, guarding and barriers, postings, locked areas. Compliance with SBMS "Electrical Safety" for work and PPE.	3	4	2	24						

Electrical Equipment & Power Supplies BNL Class C <600 V AC; <6000 V DC	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; working hot 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 hot work. Compliance with SBMS "Electrical Safety" for work and PPE.	2	4	2	16					
Electrical Disconnects And Switches	Arc blast; burn	Procedures, training, (see controls above, all apply to this). Compliance with SBMS "Electrical Safety" for work and PPE>	2	3	3	18					
Electrical Disconnects And Switches	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; working hot permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for hot work. Compliance with SBMS "Electrical safety" for work and PPE.	2	4	2	16					
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; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards. Compliance with SBMS "Electrical safety" for work and PPE.	4	4	2	32					
Motor Control Centers; Panels And Wall Sockets	Arc blast; burn	training; procedures, OPM. Compliance with SBMS "Electrical Safety" for work and PPE.	4	3	2	24					
Electrical Circuit Breaker & Switch Operating by Non-Electrical Workers <600VAC	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; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards. Compliance with SBMS "Electrical safety" for work and PPE.	1	3	2	6					
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, SBMS "Electrical Safety" for work and PPE.	4	3	3	36					
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; LOTO; Kirk keys; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards. Compliance with SBMS "Electrical safety" for work and PPE.	4	3	3	36					
Vacuum	Ear damage	Postings; PPE; maintenance; training; work planning; ASSRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; use of industry standards; design reviews, LOTO	3	4	2	24					

Vacuum	Being struck by an object such as flying debris	Postings; PPE; maintenance; training; work planning; ASSRC reviews; procedures; Tier 1 inspections; Chief ME reviews; vacuum windows covered during handling; use of industry standards; design reviews, LOTO	3	4	2	24					
Magnetic Field	Being struck by an object due to adverse mechanical force exerted on ferromagnetic objects and or to electronic/medical implants	Barriers; warning systems; postings; training; ESRC review; work planning; procedures; Tier 1 inspections; magnetic safety reviews; medical exams	1	4	2	8					
Lighting	Being struck against an object, such as a carpenter walking into a door frame, due to poor visibility	Tier 1 inspections; maintenance; emergency lighting; temporary lighting, work planning, housekeeping OPM	3	2	3	18					
Lighting	Falls on same level	Tier 1 inspections; maintenance; emergency lighting; temporary lighting, work planning, housekeeping OPM	3	3	3	27					
Lighting	Being struck by an object due to a material handling mishap	Tier 1 inspections; maintenance; emergency lighting; temporary lighting, work planning, housekeeping OPM	2	3	3	18					
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, equipment inspections, procedures	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	2	18					
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	2	12					
Manual Material Handling	Overexertion – injuries caused by excessive lifting, pushing, pulling, holding, carrying or throwing of an object	Gloves; hardhat; handcarts; dollies; training; safety shoes, weight limits, work planning.	4	3	3	36					
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 sharp surfaces	PPE; training; guarding, Tier 1 inspections; UL listed equipment; pre-inspections	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					

Walking – Working Surfaces	Falls on same level	PPE; Tier 1; work planning; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; lessons learned, procedures, PPE(safety shoes, rubber spikes for winter use). Heightened awareness and repair of walking and working surfaces, Housekeeping OPM	5	4	2	40					
Working Environment	Poor air quality; mold	HVAC; facility maintenance; Tier 1 inspections, housekeeping OPM, IH sampling if required, PE maintenance	5	2	2	20					
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, equipment inspections.	2	5	3	30					
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, LOTO, qualified personnel	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, LOTO, qualified personnel.	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	2	6					
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. Compliance with SBMS “Electrical Safety” for work and PPE.	2	4	2	16					
Transformer And Switch Yards	Arc blast	PPE; procedures; training; qualified electricians and technicians( all above rules apply). Compliance with SBMS “Electrical safety” for work and PPE.	2	3	2	12					
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; working hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards; emergency procedures, Compliance with SBMS “Electrical safety” for work and PPE.	2	4	2	16					
Standby Generators	Noise	Hearing protection( all above applies as well)	2	4	2	16					
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	2	4					
Egress	Impaired egress	Tier 1; work planning; skill of craft; P.E. scheduled maintenance; internal and external audits; posting; labeling; training; barriers; communication; internal processes; lessons learned; life safety codes; emergency preparedness, housekeeping OPM	5	3	2	30					

Pressurized Systems	Being struck by an object due to a pressure release	Postings; PPE; maintenance; training; work planning; ESRC/ASSRC reviews; procedures; interlock systems; certification/testing of pressure related equipment; Tier 1 inspections; LOTO; C-AD Chief ME reviews; codes and standards usage, LOTO	2	2	2	8					
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					
Computer And Office Machine Usage	Repetitive motion	BNL SHSD ergonomic reviews; training; use of ergonomically designed equipment, awareness of frequent break requirements.	5	3	3	45					
Batteries/UPS	Molten spray	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 hot permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards; emergency procedures, Compliance with SBMS “Electrical safety” for work and PPE.	4	2	2	16					
Limited Access Areas	Impaired egress	Tier 1; work planning; skill of craft; training; barriers;	2	1	3	6					
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					

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