

### Job Risk Analysis

Name(s) of Risk Team Members: R. Karol, P. Ingrassia, N. Kling, F. Dusek, W. Anderson, C. Watts, H. Hacker, A. Warkentien, F. Cullen				Point Value → Parameter ↓	1	2	3	4	5							
Job Title: MCR Watches, CAS Watch, Tandem Watch, Cryogenics Watch, Siemens Watch				Frequency (B)	≤once/year	≤once/month	≤once/week	≤once/shift	>once/shift							
Job Number or Job Identifier: JRA 13a-06				Severity (C)	First Aid Only	Medical Treatment	Lost Time	Partial Disability	Death or Permanent Disability							
Job Description: Routine and non-routine tours, inspection, alarm responses, of C-AD facility on a 24 hour shift rotation.				Likelihood (D)	Extremely Unlikely	Unlikely	Possible	Probable	Multiple							
Approved by: <i>E. Lessard</i> Date: 2-16-06      Rev. #: 0																
Stressors (if applicable, please list all): Heat, poor lighting, moisture, snow, extended work hours, working alone, time pressure, working alone			Reason for Revision (if applicable):				Comments:									
					Before Additional Controls					After Additional Controls						
Job Step / Task	Hazard	Control(s)	Stressors Y/N	# of People A	Frequency B	Severity C	Likelihood D	Risk* AxBxCxD	Control(s) Added to Reduce Risk	Stressors Y/N	# of People A	Frequency B	Severity C	Likelihood D	Risk* AxBxCxD	% Risk Reduction
Sweeps in buildings	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, EPD, entry log sheets, procedures, postings, access control systems, chipmunks, RCT support	Y	2	3	1	1	6								
Sweeps in buildings	Electrical	LOTO, work planning, training, procedures, postings, guarding, lighting, awareness of surroundings, Tier 1 inspections	Y	2	3	3	1	18	See Notes 1 through 4							
Sweeps in buildings	Being struck by an object due to improperly secured material or loss of control of objects in magnetic fields	LOTO, training, procedures, postings, magnetic field measurements, lighting, awareness of surroundings, Tier 1 inspections, housekeeping	Y	2	3	1	2	12								
Sweeps in buildings	Being struck by an object due to a pressure release in nearby pressurized systems	LOTO, work planning, procedures, postings, caution tags, Tier 1 inspections	Y	2	3	2	2	24								



Facility tours	Being struck by an object due to a pressure release in nearby pressurized systems	LOTO, work planning, procedures, postings, caution tags, awareness of surroundings, Tier 1 inspections	Y	1	5	3	3	45									
Facility tours	Oxygen deficiency	Training, PPE, POMs, postings, PASS oxygen alarms, installed oxygen alarms, LOTO, work planning, procedures, evacuation training	Y	1	5	3	2	25									
Facility tours	Noise	Training, procedures, PPE, postings, minimizing time spent in noise areas, medical surveillance	Y	1	5	4	2	40									
Facility tours	Falls on same level due to poor or uneven walking surfaces	Maintenance of walking surfaces, lighting, safety shoes, work planning, snow removal, posted snow removal priority buildings, annual snow removal plan discussions with BNL Site Supervisor, yellow and black tape on trip hazards	Y	1	5	3	2	30									
Facility tours	Falls to lower level such as falling from a ladder or over a railing or rolling down a shield berm	Training, railings, proper ladders, maintenance of surfaces, stairs, safety shoes	Y	1	5	3	2	30									
Facility tours	Flammable and combustible gases	Training, normal and emergency procedures, postings, work planning, gas concentration alarms	Y	1	5	2	2	20									
Facility tours	Biological hazards	Training, ventilation, PPE, cleanliness controls, ESRC reviews, normal and emergency procedures	Y	1	5	2	2	20									
Facility tours	Working alone	Cell phones, pagers, radios, cameras and communications with Control Room or Site Supervisor, calling-in for assistance to perform tasks	Y	1	5	3	3	45									
Facility tours	Being struck against an object such as walking into a door frame or an obstruction in the walkway	OSHA compliance with regard to walkway obstructions, yellow and black warning tape on trip hazards or walkway obstructions, proper lighting, protective covers on obstructions in walkways	Y	1	5	3	3	45	See "Further Description of Controls Added to Reduce Risk" below								
Provide safety watch	Ionizing radiation exposure	RWP, training, surveys, PPE, TLD, EPD, entry log sheets, procedures, postings, access control systems, chipmunks, RCT support, 2-man oversight	Y	2	3	1	2	12									
Provide safety watch	Electrical	LOTO, work planning, training, procedures, postings, guarding, PPE, working hot permits, safe distance requirements, Fire/rescue group, emergency response, 2-man oversight	Y	2	4	3	1	24	See Notes 1 through 4								



Incidental cleanup	Overexertion – injuries caused by excessive lifting, pushing, pulling, holding, carrying or throwing of an object	Work planning, back safety training as appropriate, dollies, hand trucks, limits on single person lifting weight	Y	2	3	2	3	36									
Incidental cleanup	Falls on same level	Work planning, proper shoes, snow removal, work surface maintenance, roof maintenance, postings, Tier 1 inspections	Y	2	3	3	2	36									
Incidental cleanup	Bodily reaction – injuries resulting from bending, climbing, loss of balance and slipping without falling	Work planning, back safety training as appropriate, dollies, hand trucks, snow removal	Y	2	3	2	3	36									
Incidental cleanup	Falls to lower level, such as falling from a ladder or over a railing	Postings, railings, work planning, ladder training	Y	2	3	3	3	54									
Incidental cleanup	Being struck by an object, such as a tool falling on a worker from above	PPE, work planning, postings, barriers, Tier 1 inspections	Y	2	3	3	2	36									
Incidental cleanup	Being struck against an object, such as a carpenter walking into a door frame	PPE, work planning, awareness of surroundings	Y	2	3	2	2	24									
Incidental cleanup	Becoming caught in or compressed by equipment	Guarding, work planning, postings, awareness of surroundings	Y	2	3	4	2	48									
Incidental cleanup	Contact with temperature – extremes that result in such injuries as heat exhaustion, frost bite or burns	Guarding, postings, work planning	Y	2	3	3	2	36									
Working on Electrical Equipment & Power Supplies BNL Class A & B <250 VAC; <1000Vdc	Shock or electrocution	All equipment is listed or reviewed by CEE; Tier 1 inspections; ASSRC or ESRC Committee reviews, disconnected cable policy; installations comply with applicable codes; procedures; training; distribution drawings; LOTO; Kirk keys; working on or near permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures, NFPA 70E PPE	Y	2	3	4	2	48	See Notes 1 through 4	Y	2	3	3	1	18	63%	

Working with Electrical Equipment & Power Supplies BNL Class C <600 VAC; <6000 VDC	Arc blast; burn	Procedures, training, NFPA 70E PPE	Y	2	2	3	1	12	See Notes 1 through 4							
Operating Electrical Disconnects And Switches	Arc blast; burn	Procedures, training, NFPA 70E PPE	Y	1	3	3	1	9	See Notes 1 through 4							
Working Inside Accelerator Enclosures	Entrapment	Procedure, training, escape hatches	Y	1	3	5	1	15	See Control 2							
Operating 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 on or near permits; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; GFCI; grounding standards; emergency procedures; two-person rule for working on or near, NFPA 70E PPE	Y	1	3	3	1	9	See Notes 1 through 4							
Operating 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 on or near permits; ASSRC/ESRC reviews; qualified electricians and technicians; cabinet interlocks; postings; locked areas; guarding; work planning; grounding standards	Y	1	3	3	1	9	See Notes 1 through 4							
Operating Motor Control Centers; Panels And Wall Sockets	Arc blast; burn	NFPA 70E PPE; training; procedures	Y	1	3	3	1	9	See Notes 1 through 4							
Using 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	Y	2	3	3	2	36								
Using 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	Y	2	3	3	2	36								
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	Y	2	2	2	3	24								



Conducting pressure testing with gas	Being struck by an object due to a pressure release	LOTO, relief valve testing, procedures, training, work planning	Y	2	2	3	2	24								
Fork truck use	See <a href="#">JRA 20</a>															
Source replacement work at Linac and Tandem	Ionizing radiation exposure	Training, experts prepare sources, MSDS, CMS, procedures, RWP, RCT support if required, two people for work, fume hoods, emergency response, PPE, work planning.	Y	2	2	1	2	8								
Source replacement work at Linac and Tandem - electrical, mechanical	Becoming caught in or compressed by equipment	Procedures, LOTO, disconnects, proper grounding procedures and equipment, two man rule, expert help, work planning.	Y	2	2	4	2	32								

Further Description of Controls Added to Reduce Risk:

Controls Added FY06:

- 1) OPM 1.23, [Staff Working Hours and On-Call Hours](#), was amended to address the National Weather Service Warning System so that personnel would not be called in if a wind warning, blizzard warning or hurricane warning is issued.
- 2) OPM Chapter 4 was reviewed and procedures amended to ensure egress through an escape hatch is possible following a heavy snow; that is, the operators must check to see if escape hatch doors can be opened from the inside.
- 3) The following issues are assigned to P. Cirmigliaro (ESHQ Division) for follow-up. The remain from JRA 13-05:
  - the walkway along the turbines in the compressor building (1005) needs to be widened, and protective covers need to be installed over turbine brakes that extend into the walkway
  - external lighting needs to be fixed on the refrigerator building (1005)
  - a cross-bar in the walkway near an exit in the refrigerator building (1005) needs yellow and black warning tape
  - workers in CAS Group need to wear safety shoes at all times during working hours since they are on-call to respond anywhere in the complex
  - a step needs to be installed in the valve box pits at 1005 (8 and 2 o'clock buildings) and lighting needs to be fixed in the 4 o'clock building
  - consult on possible upgrade of POMs for the CAS Group

Notes 1-4 from prior JRAs:

NOTE 1: OSHA Teams visited C-AD during the period October 20 through October 31, 2003 and recorded electrical non-compliances. All OSHA findings will be closed by 2006 by full compliance or with an equivalent level of safety. The status of the OSHA items are maintained in BNL's Compliance suite, and closed on a schedule commensurate with funding.

NOTE 2: A compliance plan to have all electrical installations accepted by an Authority Having Jurisdiction (AHJ), as per 29CFR1910 Subpart S, has been implemented by BNL. UL, CSA, LLC or other NRTL accepted equipment will be acquired at BNL for all future installations. Prior installations are being reviewed and accepted by qualified AHJs. The plan must be completed by 2009.

NOTE 3: Full compliance with NFPA 70E was adopted by the C-AD in December 2005. NFPA 70E prescribes protective clothing to protect against shock and arc blast; thus reducing the severity and likelihood of an injury. It also prescribes training, which is currently fulfilled by taking the 2005 version of Electrical Safety 1 and by attending the C-AD 3-hour classroom course on electrical safety rules and PPE.

NOTE 4: Contractor and vendor training in work planning and electrical safety has been improved. Plans to reach all contractors and vendors with regard to NFPA 70E requirements prior to performing work at BNL have been implemented. C-AD has obtained lists of all its vendors and suppliers and is ensuring that they take Electrical Safety 1 or have equivalent training if needed.

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