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XXX, 2007

Mr. Michael Holland
Site Manager
Brookhaven Site Office
Upton, New York 11973

Dear Mr. Holland:

Enclosed please find the Collider-Accelerator Department Energy Recovery Linac Conduct of Operations Conformance Matrix dated XXX, 2007 for your approval. This revision complies with the BNL Subject Area on Conduct of Operations and DOE Order 5480.19. If you have any questions please contact Ed Lessard at extension 4250.

Sincerely:

Dr. Peter Bond

Copy to: D. Lowenstein
I. Ben-Zvi
E. Lessard
R. Karol



March 5, 2007

COLLIDER-ACCELERATOR DEPARTMENT (C-AD)

ENERGY RECOVERY LINAC

CONDUCT OF OPERATIONS CONFORMANCE MATRIX

Prepared By:

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Departmental Approval:

E. T. Lessard, C-AD Associate Chair for ESSHQ

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Accelerator R&D

D. Lowenstein, C-AD Department Chair

BNL Review:

P. Bond, Associate Laboratory Director for HENP

DOE Approval:

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>2) Resources</p> <p>a) Provide sufficient resources, material, and labor</p> <p>b) Do not use excessive overtime</p> <p>c) Provide technical support personnel</p> <p>d) Develop a long range staffing plan.</p>	<p>Materials Security” and OPM 9.10, “C-AD Security Committee Policy and Requirements.”</p> <p>2) Resources</p> <p>a) ERL has a minimum number of Operators and Physicists and Operating Supervision defined in the ERL Accelerator Safety Envelope. This minimum staff is deemed sufficient by DOE for safe operation, although larger staffs may be used routinely for operational and research efficiency. During operations, materials and resources for ERL are managed day-to-day by the ERL Operations Supervisor. During Shutdown, the ERL Operations Supervisor is assisted by the C-AD Maintenance Coordinator in coordination of work planning and activities. Sufficient resources are provided.</p> <p>b) Excessive overtime is avoided where possible by following the guidance in OPM 1.23, “Staff Working Hours and On-Call Hours.”</p> <p>c) The technical support personnel, ERL operators, Radiological Control Technicians (RCTs), Collider Accelerator Support (CAS) personnel and Cryogenic Systems (Cryo) Watch personnel, are staffed according to various changes in ERL operations.</p> <p>d) C-AD management prepares a long-range staffing plans for future support of ERL research, modification, operating and maintenance activities.</p>	<p>2) Resources None</p>
<p>3) Monitoring Of Operations Performance</p> <p>a) Refer to Chapter VI for operating problems</p> <p>b) Document problems for evaluation</p> <p>c) Supervisor should observe operations frequently.</p>	<p>3) Monitoring Of Operations Performance</p> <p>a) See Chapter VI for operating problems</p> <p>b) Scheduled inspections, performance indicators, audits, reviews, critiques, injury and illness reports, self-assessments and self-evaluations are used to document problems for evaluation and to observe operations. Problems are also documented via the Occurrence Reporting System (OPM 10.1). Minor issues are critiqued to reduce the chances that they lead to future occurrences. The ERL operators use a web-based machine-performance monitoring log.</p> <p>c) Supervisors participate in inspections and audits, they are members of safety review committees, and they are encouraged by C-AD management to</p>	<p>3) Monitoring Of Operations Performance None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>d) Operations Goals should be to:</p> <ul style="list-style-type: none"> i) Minimize the unavailability of the safety system ii) Minimize personnel errors iii) Conform to ALARA guidelines iv) Minimize loss of the facility capability v) Minimize the number of unscheduled shutdowns vi) Complete inspections on a timely basis vii) Minimize the amount of overtime 	<p>‘supervise by walking around.’</p> <p>d) Operations Goals</p> <ul style="list-style-type: none"> i) Operations procedures minimize the unavailability of safety systems by requiring operations to be curtailed should safety systems fail to operate ii) Minimizing personnel errors is a goal, see C-A-OPM XXX , "ERL Operations Organization and Administration." INPO Human Performance approaches are used to minimize events by recognizing error-likely situations iii) ALARA is integrated into routine operations via OPM XXX, "ALARA Strategies for Tuning during ERL Operations" and into work review and planning via ALARA Committee procedures (OPM Chapter 9.5 series). ERL operations aim at reducing beam losses to the lowest reasonably achievable level. iv) High reliability is a C-AD goal given the overarching constraints of safety and the available resources. Equipment breakdown is considered during ERL design, modifications, operations and maintenance based upon experience gained in the past 45 years. v) Unscheduled shutdowns are minimized through periodic maintenance, formal reporting of problems using good communications between physicists and operators such as the Weekly Time Meeting and the C-AD Web Site, and by designing equipment to be "radiation hardened." vi) Completing inspections on a timely basis is ensured through written procedures and checklists for ERL Operators, Physicists, RCTs, Cryo Watch, CAS and system specialists. vii) Overtime is specifically addressed in OPM 1.23, "Staff Working Hours and On-Call Hours." 	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>viii) Achieve and maintain complete staffing and training requirements</p> <p>ix) Minimize waste</p> <p>x) Minimize the number of lighted annunciators</p> <p>xi) Goals should be measurable, achievable, and auditable</p> <p>xii) Develop an Action Plan to meet goals</p>	<p>viii) Achieving and maintaining complete staffing and training requirements are requirements in OPM XXX, "ERL Operations Organization and Administration." For example, see the minimum staffing requirements for ERL operations in XXX, "Accelerator Safety Envelope Parameters for the Energy Recovery Linac."</p> <p>ix) Waste minimization is a formal program in SBMS, and requirements are implemented via the OPM 8.20 and OPM 8.22 series of procedures that deal with hazardous, radioactive and clean waste plus recycling. Also see OPM 1.7, "Supervisory Practice for Working with Hazards," which describes supervisor responsibilities in this area. Waste minimization and pollution prevention are specific responsibilities listed in each person's R2A2 (Roles, Responsibility, Accountability and Authority). It is also considered during the environmental concerns portion of planning of work as shown on the Work Permit form.</p> <p>x) When new systems are introduced into the ERL, human factors are considered in the design of panels and annunciators.</p> <p>xi) Goals such as days away from work or transfer (DART) case rate, collective dose and dose per proton are measurable and many have been achieved each year over the last decade. Specific operations goals are included in the Department's Self-Assessment Plan. ALARA goals are included in OPM 9.5.7, "ALARA Goals." Periodic meetings of ERL staff occur during operations and less frequently during major shutdowns. Each week ERL physicists, operators, system specialists, and C-AD management meet to critique the previous week's operations and to discuss future goals.</p> <p>xii) The Self Assessment Plan is an action plan for Department operations. Ad hoc groups or C-AD committees typically develop action plans in response to an event or audit results. Action plans to meet goals are also found in the Department's Environmental Management Programs and OSH Management Plan that relate to BNL environmental and OSH goals.</p>	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>xiii) Report results of audits to facility management and DOE</p> <p>xiv) Perform Self-Assessments</p>	<p>xiii) Results of audits are reported to C-AD management and where applicable up the line to DOE. Annually, results of audits are reviewed at the Department’s Environmental, OSH and Self Assessment Management Review.</p> <p>xiv) Management and worker self-assessments and self-evaluations are conducted on an established schedule and reports are forwarded to C-AD management. Corrective actions are tracked to closure via the Assessment Tracking System (ATS). See OPM 9.4.2, "C-AD Self Evaluation" and OPM 13.10.1, "Independent Assessment." The C-AD Enhanced Work Planning Procedure, OPM 2.28, “C-AD Procedure for Work Planning and Control for Operations,” contains a job-specific assessment module that requires workers to assess specific jobs at completion. The department’s self-assessment program is described in terms of the Baldrige Award Criteria in the Assessment Planning and Evaluation Criteria Framework as defined in the SBMS Integrated Assessment Subject Area.</p>	
<p>4) Accountability</p> <p>a) Hold workers and supervisors accountable for their actions</p> <p>b) Use discipline and performance appraisals to ensure accountability</p>	<p>4) Accountability</p> <p>a) The C-AD has a formal performance appraisal program and Roles, Responsibilities, Authorities and Accountability (R2A2) program for all C-AD staff. These documents are maintained by the C-AD Chairman's Office.</p> <p>b) Adhering to all rules, including rules dealing with safety, quality, operations or maintenance, is factored into an individual’s appraisal, performance goals and R2A2. Discipline has been used when appropriate as described in OPM 1.26, “C-AD Standards for Disciplinary Action.” For example, letters to a personnel file have been written when procedures were not followed. On other occasions, personnel have been given time off without pay or Users have had letters sent back to their University management when safety rules were willfully violated.</p>	<p>4) Accountability None</p>
<p>5) Management Training</p> <p>a) Formal training of supervisors and other management should be incorporated into overall training plan.</p>	<p>5) Management Training</p> <p>a) The C-AD Training Plan is described in OPM 1.12, “Conduct of Training Policy (Training Plan).” The C-AD has performed job assessments for all positions including management and supervisors, and has developed corresponding training requirements. The C-AD Training Manager maintains the Job Training Assessments (JTA). There is a separate training</p>	<p>5) Management Training None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>6) Planning For Safety</p> <p>a) Provide guidance to personnel so that they understand safety requirements</p> <p>b) Explain the role of Safety Analysis system to all operations personnel</p>	<p>program to familiarize permanent and visiting staff about the safety requirements when operating and maintaining ERL.</p> <p>6) Planning For Safety</p> <p>a) All jobs are assessed for environmental, safety and health hazards, and the necessary training is given before persons are authorized to perform the job. In order to guide personnel, the C-AD has incorporated job-specific safety requirements into OPM procedures. See OPM 2.28, "C-A Procedure for Work Planning and Control for Operations," and OPM 2.29, "C-AD Enhanced Work Planning Procedure for Experimenters." Where appropriate, C-AD has required staff and users to qualify in formal training programs where job-specific safety rules are explained.</p> <p>b) The ERL Accelerator Safety Envelope (OPM XXX) sets the limits for safe ERL operations. Safety analysis and DOE approval are required for operations outside the envelope. Management requirements to control change at the accelerators or experiments are set down in OPM Chapter 9 procedures for physicists and engineers, and in OPM 2.11, "Conduct of Operations for Accelerator Physicists and System Specialists," which is directly relevant to accelerator physicists or beam commissioners. C-AD accelerator physicists, beam commissioners, project engineers, project physicists, liaison engineers and liaison physicists are made familiar with the requirements for safety review through periodic training. For operations that inadvertently go beyond the safety envelope, operators are required to report via the Occurrence Reporting Procedure, OPM 10.1. All operations staff is made aware of the protocols either for reporting occurrences or for scheduling safety reviews through facility-specific and job-specific training programs.</p>	<p>6) Planning for Safety None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Status Reports</p> <p>a) Notify Supervisor of changes in facility status, and all abnormalities and unexpected situations</p>	<p>1) Status Reports</p> <p>a) ERL staff, supervisors and managers follow OPM 10.1, "Occurrence Reporting and Processing of Significant Operations Information." Events that do not meet the criteria of OPM 10.1 are critiqued based upon their significance. The ERL Operators log documents day-to-day changes in facility status and is reviewed each day by C-AD management. Abnormalities and unexpected situations are reported according to the notification list in OPM XXX, "ERL Emergency Notification List," and at the rest of C-AD in OPM 10.1.a, "Occurrence Notification Call List."</p>	<p>1) Status Reports None</p>
<p>2) Safety Practices</p> <p>a) Adhere to BNL safety program, including the use of protective equipment</p>	<p>2) Safety Practices</p> <p>a) ERL follows OPM 2.2, "Operating Practices" as it applies to aERL operations. This requires operators and physicists to adhere to procedures and to sound operating practices. All operators and physicists are trained in appropriate safety courses such as electrical safety, radiation safety, and hazardous materials handling. Areas and/or equipment are posted with requirements for protective equipment such as safety glasses, hearing protection, hard hats and non-treated, natural fiber clothing. Work planning procedures, OPM 2.28, "C-A Procedure for Work Planning and Control for Operations" and OPM 2.29, "Procedure for Enhanced Work Planning for Experimenters" are used to define safety requirements including protective equipment at the planning stage for specific jobs or experiments.</p>	<p>2) Safety Practices None</p>
<p>3) Inspection Tours</p> <p>a) Perform inspection tours to ensure the status of equipment is known</p> <p>b) Use tours to become familiar with the facility condition</p> <p>c) Tour activities should include:</p> <p>i) Reviewing equipment status</p> <p>ii) Looking for unexpected conditions</p>	<p>3) Inspection Tours</p> <p>a) The ERL Operation Supervisor visits ERL on a daily basis to review the log, and become familiar with operating difficulties.</p> <p>b) Tour activities at C-AD are covered in OPM 2.2 "Operating Practices." ERL operators and physicists perform a tour of the ERL facility and perform surveillance activities according to their procedures. Tours or sweeps are also used to ensure personnel are out of primary beam areas before beam is enabled.</p> <p>c) Tour activities include the following:</p> <p>i) A periodic review of equipment status including an examination of radiation levels, particle fluence rates, system pressures, temperatures and access control mode.</p> <p>ii) Operators and physicists are trained to look for unexpected conditions such as radiation levels, water leaks or smoke and to check local status</p>	<p>3) Inspection Tours None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>iii) Checking panel & annunciator operation</p> <p>iv) Notation of any deficiencies found</p>	<p>panels and local alarms when on tour. The operators and physicists are also trained to inspect for area-specific abnormal conditions.</p> <p>iii) Local annunciators alert the person on tour to abnormal conditions. For inaccessible areas, panel annunciators are used to alert the ERL staff in the ERL Control Room. Primary areas are inaccessible during operations periods. Inaccessible areas use various sensors for smoke, water, pressure, oxygen concentration, ground faults and radiation which annunciate in the ERL Control Room and/or at the CAS watch station in Building 940 when appropriate.</p> <p>iv) Deficiencies are noted in the logs of the various touring groups or, if necessary, reported back up the supervisory chain for immediate action</p>	
<p>4) Round Tours</p> <p>a) Use approved Round Tour Inspection Sheets</p> <p>b) Record key parameters to analyze performance of systems and equipment and to facilitate shift turnover</p> <p>c) Round sheets should have the maximum and minimum values and operational safety limits highlighted to facilitate comparison with noted values.</p> <p>d) Review recorded values for trends</p>	<p>4) Round Tours</p> <p>a) The ERL Operators and Physicists, RCTs, Cryogenic Watch, Collider Accelerator Support (CAS) perform tours and record their findings. Approved inspection sheets are used; for example, area-specific sweep checklists, RCT survey forms, and Hazardous Gas Checklists.</p> <p>b) Key parameters for equipment and systems are monitored and recorded in the ERL Control Room, Cryogenic Control Room, and at remote locations. Set points are monitored in the ERL Control Room. Shift records are maintained and reviewed during system startup or shift change.</p> <p>c) The maximum and minimum values are in the controls database for parameters monitored from the ERL Control Room. Operational safety limits are listed in procedures. Maximum radiation levels are denoted by standard radiological area classifications. Cryogenic and other support systems have parameter ranges posted locally or written on log sheets.</p> <p>d) Radiation surveys and area monitoring data are routinely reviewed to estimate potential exposure of workers and experimenters. Equipment operations are continually monitored at the ERL Control Room and undesirable trends are determined in advance of equipment failures. For example, the radiation monitoring system detects beam losses well before serious radiation events occur. Operators or Physicists respond to this alert by returning power supplies back to service or by realigning the beam</p>	<p>4) Round Tours None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
	<p>through magnet current settings. Radiation alarms are automatically recorded. Radiation data is summarized in hourly averages along with beam-intensity data and these values are reviewed periodically by supervisors and management, and daily by the RCTS. The C-AD Radiation Safety Committee and the ALARA Committee review the long-term trend of radiation levels. In the event of machine interruption, summaries of operator actions are recorded in the Operations Journal, and the Journal is reviewed each day. Various categories of machine downtime are recorded and long-term trends are examined by the ERL Operations Supervisor and C-AD management.</p>	
<p>5) Personnel Protection</p> <ul style="list-style-type: none"> a) Conform to 10CFR835 (ALARA) b) Assure proper use of Work Permits c) Supervisors should review exposure trends of workers 	<p>5) Personnel Protection</p> <ul style="list-style-type: none"> a) Operators. Physicists and system experts are trained in ALARA practices during: a) BNL's Rad Worker I training, b) Collider-Accelerator Access training, which is C-AD site-specific training, ERL Specific training and c) BNL's Contamination Worker training. Additionally, the C-AD ALARA Committee procedures are in conformance with 10CFR835 Implementation Guide for Occupational ALARA Program. b) Work Permits (OPM 1.11 and OPM 2.28) or Radiation Work Permits (OPM 9.5.4) are required for specific jobs at C-AD and ERL. Proper use of these permits is reviewed via C-AD self-assessments or via quality assurance audits. Standing work permits are used for routine tours, inspections or work observations and skill-of-the-worker tasks. c) Supervisors review exposure trends periodically by reviewing self-reading dosimeter data and TLD results. The C-AD ESHQ Division management reviews and posts individual dose data each month on the web. Managers, ALARA Committee members, and supervisors review quarterly dose records via the C-AD Performance Indicator program. From time-to-time, special ad hoc committees made up of supervisors and managers are set up to review overall exposure trends at C-AD. Annually, the C-AD ALARA Committee reviews all radiological data from the prior year and makes recommendations to the C-AD Department Chair on dose goals for the coming year. 	<p>5) Personnel Protection None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>6) Response to Indications</p> <p>a) Identify and correct faulty instruments</p> <p>b) Believe instrument readings unless proven unreliable</p>	<p>6) Response to Indications</p> <p>a) Prompt action is taken to investigate abnormal or unexpected indication, see, for example, OPM XXX, "Responding to Chipmunk Interlocks," or OPM XXX, "Responding to Chipmunk Alarms".</p> <p>b) Operators, physicists and system specialists are instructed to believe instrument readings and treat them as accurate unless proven otherwise, see OPM 2.2, "Operating Practices," section 2.7. In order to instill trustworthiness, the area-radiation system is calibrated annually according to ANSI standards. See OPM 8.15.1, "C-A Equipment Annual Calibration Procedure for Chipmunks" and 8.15.2, "C-A Equipment Calibration Procedure for Chipmunk Test Box." The function of the Access Control System is also tested every year to ensure reliability. See OPM Chapter 4.</p>	<p>6) Response to Indications</p> <p>None</p>
<p>7) Resetting Protective Devices</p> <p>a) Understand current conditions prior to resetting protective devices</p>	<p>7) Resetting Protective Devices</p> <p>a) When a protective device trips ERL down to a safe state, such as would happen if unexpected radiation was seen by a Chipmunk area-radiation monitor, an undertaking is made by Operators and Physicists to understand the trip before the device is reset. The formality of this undertaking is written into procedures. See, for example, OPM XXX, for radiation alarm response and OPM XXX for oxygen deficiency alarm response.</p>	<p>7) Resetting Protective Devices</p> <p>None</p>
<p>8) Load Changes</p> <p>a) Supervisor must approve any changes</p>	<p>8) Load Changes</p> <p>a) The ERL Operator in Charge approves all power or process rate changes. See OPM 2.2, "Operating Practices," section 2.9. Additionally, drawings must be prepared, reviewed and acknowledged, to assure that all safety procedures have not been compromised before ac power systems are changed, see OPM 8.17.1, "Procedure for Documenting and Acknowledging Changes to AC Power Systems for Collider-Accelerator." Finally, the ERL Operations Supervisor provides guidance to the ERL Operators and Physicists on which major loads shall be turned off when they are no longer needed for safety, equipment protection or programmatic reasons. See OPM 2.30, "Monitoring, Controlling and Minimizing Unnecessary Power Consumption by C-A Accelerators."</p>	<p>8) Load Changes</p> <p>None</p>
<p>9) Authority to Operate</p> <p>a) Operators should understand their authority to operate and that of the Supervisor</p>	<p>9) Authority to Operate</p> <p>a) Trained and qualified personnel operate ERL equipment. A web-based database lists all training records and identifies qualified personnel according to job classification (e.g., ERL Operators, Physicists, CAS, Cryogenic Watch, RCTs and System Specialists). R2A2s are signed by</p>	<p>9) Authority to Operate</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
	<p>personnel so that they are able to personally acknowledge their roles, responsibilities, authorities and accountabilities.</p>	
<p>10) Shift Operating Bases a) Establish places for administration, communications, and shift turnover</p>	<p>10) Shift Operating Bases a) The ERL Control Room serves as the operating base. It is equipped with office equipment needed to conduct duties, including communications equipment. It has areas for conducting shift changeover activities. Other operating bases include the RCT Offices, and the CAS Watch Building. These areas are also equipped with appropriate communications.</p>	<p>10) Shift Operating Bases None</p>
<p>11) Potentially Distractive Material a) Should be prohibited or controlled</p>	<p>11) Potentially Distractive Material a) Written material not pertinent to operations and entertainment devices are generally prohibited from use by on-duty personnel unless specifically approved by the Head of Operations. See OPM 2.3, "Activities in Control Rooms."</p>	<p>11) Potentially Distractive Material None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Control Area Access a) Only for official business b) Restrict access to controls c) Entry allowed by authorized individuals	1) Control Area Access a) The ERL Control Room is limited to those persons on official business only. See OPM 2.3 , "Activities in Control Rooms." It has clear boundaries of walls and glass doors. b) Only trained Operators, Physicists and System Specialists may manipulate controls and be unsupervised. Physicists may perform accelerator studies using a formal procedure, checklists and authorizations, see OPM 2.11 , "Conduct of Operations for Accelerator Physicists and Systems Specialists." c) Authorized entry to ERL Control Room is under the purview of the ERL Operator in Charge. See OPM 2.3 , "Activities in Control Rooms". All areas that are controlled for access are locked, and keys are issued only to trained and qualified personnel. Locks for primary areas are controlled electrically and the Access Control System automatically disables key access when beam is enabled.	1) Control Area Access None
2) Professional Behavior a) Prohibit distractions	2) Professional Behavior a) Professional behavior is encouraged at all times. Potentially distracting activities are generally prohibited; the ERL Operator in Charge is the arbitrator. See OPM 2.3 , "Activities in Control Room."	2) Professional Behavior None
3) Monitoring the Main Control Panels a) Take action to determine cause of abnormalities b) Provide backup to computer control systems	3) Monitoring the Main Control Panels a) Operators and Physicists are trained to respond to alarms in a timely fashion, taking reasonable actions. For example, see OPM 2.2 , "Operating Practices," Section 2.7, OPM 6.1.2 , "Responding to Chipmunk Interlocks," OPM 6.1.3 , "Responding to Chipmunk Alarms," and OPM 2.19 , "Response to Water Makeup Alarms." b) Computer controlled interlocks are maintained by two separate and independent computer systems. The hard-wired interlock system is dual and independent. The action of hard-wired interlocks is monitored and automatically recorded on a computer. Both the computer-controlled and hard-wired access control systems are maintained on un-interruptable power supplies. All systems fail safe on loss of electrical power.	3) Monitoring the Main Control Panels None

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Control Room Operator Ancillary Duties a) Limit the ancillary activities of operators b) If appropriate, perform administrative duties away from controls	4) Control Room Operator Ancillary Duties a) Ancillary duties assigned to operators do not interfere with their ability to monitor parameters. Reviewing procedures and required reading do not comprise a major portion of shift responsibilities. b) Administrative duties may be performed at operating consoles as long as they do not interfere with the operator's primary duties.	4) Control Room Operator Ancillary Duties None
5) Operation of Control Area Equipment a) Operate only with specific authorization b) Trainees should be supervised	5) Operation of Control Area Equipment a) Only persons specifically authorized by procedure may operate equipment from the ERL Control Room. Authorizations are given by the Accelerator Division management based on meeting the training qualification. See OPM 2.11 "Conduct of Operations for Accelerator Physicists and Specialists." Training records are web-based. b) Trainees are not allowed to work alone at any location including the Main Control Room unless they are supervised. See OPM 2.4 , "Operator Trainees."	5) Operation of Control Area Equipment None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Emergency Communications Systems</p> <p>a) Provide means to notify personnel of an emergency</p> <p>b) Periodically test emergency communications systems</p> <p>c) Control Area should be able to override the communications systems</p>	<p>1) Emergency Communications Systems</p> <p>a) Emergency signals such as fire or evacuation alarms are audible throughout the C-AD buildings, including ERL, where appropriate. The public address system can be heard throughout the normally occupied areas of the complex. A radio-receiver system is used for site-wide emergency or exigent communications. The C-AD ESHQ Division, secretaries and certain C-AD buildings are supplied with these radio-receivers, which are called plectrons. See OPM 3.0, "Local Emergency Plan for the Collider Accelerator Department," Section 5.2 "Emergency Signals."</p> <p>b) Emergency communications systems are tested weekly. The C-AD emergency drill program is under the purview of the C-AD ESHQ Division, and periodic drills conducted at least annually are used to test all aspects of emergency preparedness. Site-wide drills test the adequacy of site-wide communications systems.</p> <p>c) The Main Control Room can override the public address system for emergency announcements. See OPM 3.0, "Local Emergency Plan for the Collider Accelerator Department," Section 5.3 "Communications."</p>	<p>1) Emergency Communications Systems None</p>
<p>2) Public Address Systems</p> <p>a) Should be administratively controlled</p> <p>b) Includes the use of the paging systems</p>	<p>2) Public Address Systems</p> <p>a) Access to the public address system is through C-AD administrative offices or through the Main Control Room, see OPM 2.12 "Communications Practices"</p> <p>b) The C-AD uses pagers, e-mail and telephones in lieu of the public address system whenever practical. Pagers are issued to individuals and pager numbers are published in the BNL and C-AD phone directory.</p>	<p>2) Public Address Systems None</p>
<p>3) Contacting Operators</p> <p>a) Distinguish between emergency and normal communications</p>	<p>3) Contacting Operators</p> <p>a) ERL Operators use hand held radios for communications in order to be in constant contact with the Main Control Room or CAS Watch. See OPM 2.12 "Communications Practices." Language to be used in an emergency is prescribed in C-AD OPM Emergency Procedures, C-AD OPM Chapter 3.</p>	<p>3) Contacting Operators None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>4) Radios</p> <p>a) Post areas where use of radios will cause interference with equipment</p> <p>b) Consider the use of dedicated radio channels for specific operations groups</p>	<p>4) Radios</p> <p>a) There are no radio-cast devices in use at C-AD other than communications. However, there are spots where hand-held radios do not receive signals successfully, and these locations are posted.</p> <p>b) Radio channels F1, F2 and F3 are dedicated to C-AD. F1 is for operations and F2 and F3 are for maintenance communications. C-AD can also communicate directly with BNL Fire/Rescue during emergencies via channels F4 and F5. See OPM 2.12, "Communications Practices."</p>	<p>4) Radios None</p>
<p>5) Abbreviations & Acronyms</p> <p>a) Use approved list for written and verbal communications</p>	<p>5) Abbreviations & Acronyms</p> <p>a) Approved acronyms for emergency communications are listed in OPM 3.1, "Emergency Procedure to be Implemented by the Department Emergency Coordinator" and OPM 3.2, "Emergency Procedure to be Implemented by the Local Emergency Coordinator." Specific ERL Emergency Procedures are contained in Section 3 of the C-AD OPM.</p>	<p>5) Abbreviations & Acronyms None</p>
<p>6) Oral Instructions & Information Communication</p> <p>a) Should be clear and concise</p> <p>b) Use repeat back techniques to assure accurate communication</p>	<p>6) Oral Instructions & Information Communication</p> <p>a) ERL Operators and Physicists are instructed to speak clearly and concisely. See OPM XXX, "Emergency Procedures to be Implemented by ERL Operators or Collider-Accelerator Support Technicians"</p> <p>b) ERL Operators and Physicists are trained to repeat information, see OPM 2.12, "Communications Practices"</p>	<p>6) Oral Instructions & Information Communication None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Adhere to Training Program</p> <p>a) Program should list requirements for training, and items to be accomplished</p>	<p>1) Adhere to Training Program</p> <p>a) The C-AD adheres to the SBMS Subject Areas for Training and Qualifications for various training requirements. Specific Department policies and requirements for training programs are defined OPM 1.12, "Training and Qualification Plan." Required training needs are identified and documented for all departmental personnel. The development of these needs is a cooperative effort between the individual's supervisor, ESHQ Associate Chair, ESHQ Division Head, and the Training Manager. The training needs may be generic for the various C-A positions and may be specific for the individual or a combination of both.</p>	<p>1) Adhere to Training Program</p> <p>None</p>
<p>2) On-Shift Instructor Qualification</p> <p>a) The qualifications of instructors must be defined</p>	<p>2) On-Shift Instructor Qualification</p> <p>a) ERL Training is conducted by qualified personnel. Instructors are selected based upon skills and subject-matter knowledge. Subject matter experts are assigned by C-A management, with the concurrence of the Training Manager, to teach specific courses on the basis of their knowledge of systems and equipment, their experience, and on their academic background. Certification of trainers for specialized courses is made by the agency or organization providing the course certification. Certain Department members are automatically considered qualified to teach courses within their authority. See CA-OPM-ATT 1.12.b, "Instructors Qualified by Department Position or Authority."</p>	<p>2) On-Shift Instructor Qualification</p> <p>None</p>
<p>3) Qualified Operator Supervision & Control of Trainees</p> <p>a) Careful observation of trainees is required</p> <p>b) Instructor should discuss procedure steps in detail</p> <p>c) Instructor should be able to intervene, if required</p> <p>d) Instructors should verify any recorded readings and discuss the implications of trends and off-normal readings</p>	<p>3) Qualified Operator Supervision & Control of Trainees</p> <p>a) ERL Trainees are observed by qualified Operators or Physicists. See OPM 2.4, "Operator Trainees"</p> <p>b) ERL Procedure training is via classroom, question and answer forms or by walk-through of the procedure steps with the instructor</p> <p>c) ERL Instructors for operators are supervisors, lead personnel and system specialists and supervisors are trained to intervene or stop work when needed</p> <p>d) Verifying recorded readings and discussing implications of trends and off-normal readings is part of the training</p>	<p>3) Qualified Operator Supervision & Control of Trainees</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Operator Qualification Program a) Program should be approved and any changes reviewed by appropriate management	4) Operator Qualification Program a) The C-AD Training and Qualification plan is approved by C-AD and BNL managements. ERL Operator and Physicist tasks at the C-AD are assessed by management, the ESHQ Division, the supervisor and the workers. They assess for duties and responsibilities, competencies, education requirements and environmental, safety or health hazards. Changes to qualification programs are reviewed and approved by C-AD management.	4) Operator Qualification Program None
5) Training Documentation a) Document classroom instruction, written exam, and On-the-Job Training requirements	5) Training Documentation a) Exams, documentation of classroom or on-the-job training programs, and other written training materials are maintained by the C-AD Training and Procedures Manager or are automatically tracked via BTMS .	5) Training Documentation None
6) Suspension of Training a) If an abnormal or emergency condition occurs training should be suspended	6) Suspension of Training a) Operation of ERL equipment by operator/physicist-trainees is suspended when necessary to ensure safe and reliable operation of the ERL, see OPM 3.1 , "Emergency Procedures to be Implemented by the Department Emergency Coordinator", Section 5.7.	6) Suspension of Training None
7) Maximum Number of Trainees a) Set limits for number of students and the ratio of instructors to trainees	7) Maximum Number of Trainees a) The maximum and minimum number of trainees allowed to simultaneously participate in training is considered for each training course	7) Maximum Number of Trainees None
8) Use of Trainees to Support Operations a) Document how and when trainees can be used	8) Use of Trainees to Support Operations a) The use of trainees to support operations is documented in OPM 2.4 , "Operator Trainees", Section 2.2.	8) Use of Trainees to Support Operations None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Events Requiring Investigation</p> <p>a) Establish criteria for when to perform an investigation</p> <p>b) List specific events requiring investigation</p> <p>c) Establish criteria for a "near miss" situation</p> <p>d) The following events require investigation:</p> <p>i) Violation of design limits</p> <p>ii) Unusual, abnormal, or unexplained performance or safety conditions</p> <p>iii) Improper positioning of safety system features</p> <p>iv) Unexplained shutdown</p> <p>v) Violation of a procedure or human error which could have serious implications</p> <p>vi) Failure of equipment with safety implications</p> <p>vii) Exceeding radiological or toxic substance limits</p> <p>viii) Actual or attempted sabotage</p>	<p>1) Events Requiring Investigation</p> <p>a) Criteria for when to perform an investigation are given in OPM 10.1, "Occurrence Reporting and Processing of Significant Operations Information", OPM 9.4.5, "C-A Accident/Incident Investigation," and SBMS Subject Areas Occurrence Categorizer's Procedure and Investigation of Incidents, Accidents and Injuries. An on-duty ORPs Categorizer is available at all times by calling 631-433-0443.</p> <p>b) Specific events requiring investigation at the C-AD are defined in the Subject Area and the ORPs Categorizer's Procedure. Categorizers are trained to assist managers in determining the need to classify and criteria used. Events requiring investigation in accordance with DOE Orders are identified in SBMS Subject Areas Occurrence Categorizer's Procedure and Investigation of Incidents, Accidents and Injuries.</p> <p>c) Criteria for a near miss are given in OPM 10.1 and in the Occurrence Categorizer's Procedure administered by the Quality Management Office.</p> <p>d) OPM 10.1 , OPM 9.4.5 and the Occurrence Categorizer's Procedure establishes the following as events requiring investigation:</p> <p>i) Violation of design limits</p> <p>ii) Unusual, abnormal or unexplained performance or safety conditions</p> <p>iii) Improper positioning of safety system features</p> <p>iv) Unexplained shutdown</p> <p>v) Violation of a procedure or human error which could have serious implications</p> <p>vi) Failure of equipment with safety implications</p> <p>vii) Exceeding radiological or toxic substance limits</p>	<p>1) Events Requiring Investigation</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> ix) Review committee deems an investigation is necessary x) Loss of Special Nuclear Material xi) Occurrence of repetitive problem 	<ul style="list-style-type: none"> viii) Actual or attempted sabotage ix) Whenever a review committee deems an investigation is necessary x) Not applicable at ERL xi) Occurrence of repetitive problem 	
<ul style="list-style-type: none"> 2) Investigation Responsibility <ul style="list-style-type: none"> a) Manager has ultimate responsibility for consistency and thoroughness of event investigation 	<ul style="list-style-type: none"> 2) Investigation Responsibility <ul style="list-style-type: none"> a) The C-AD Department Chairman is named the C-AD Facility Manager and has the ultimate responsibility to conduct a consistent and thorough investigation, see OPM 10.1 , “Occurrence Reporting and Processing of Significant Operations Information” 	<ul style="list-style-type: none"> 2) Investigation Responsibility None
<ul style="list-style-type: none"> 3) Investigator Qualification <ul style="list-style-type: none"> a) Investigators should be knowledgeable with no vested interest or bias b) Investigators should be trained 	<ul style="list-style-type: none"> 3) Investigator Qualification <ul style="list-style-type: none"> a) BNL staff members from the ESHQ Directorate and other BNL technical experts are available to assist the C-AD subject matter experts in investigations. The Occurrence Reporting and Processing System (ORPs); Investigation of Incidents, Accidents and Injuries; and Critiques subject areas provide guidance for responsible investigators. This team approach helps ensure an unbiased investigation. b) Trained investigators are appointed to investigation committees 	<ul style="list-style-type: none"> 3) Investigator Qualification None
<ul style="list-style-type: none"> 4) Information to be Gathered <ul style="list-style-type: none"> a) Collect the following information as soon as possible: <ul style="list-style-type: none"> i) Initial condition of facility ii) Statements of operators and other personnel iii) Logs and computer printouts 	<ul style="list-style-type: none"> 4) Information to be Gathered <ul style="list-style-type: none"> a) The initial actions by the Operators, Physicists and System Specialists are to take any actions necessary to make the area safe without endangering the health and safety of themselves or other personnel. The Occurrence Reporting and Processing System (ORPs); Investigation of Incidents, Accidents and Injuries; and Critiques Subject Areas detail these requirements. Initial information collection requirements include: <ul style="list-style-type: none"> i) A record of date and time of the event, date and time of all notifications and initial condition of the facility ii) A record based on operator/physicist statements regarding a step by step sequence of events leading to the incident if known. iii) Logs and computer printouts that are retrievable after an event. 	<ul style="list-style-type: none"> 4) Information to be Gathered None

GUIDELINE	PERFORMANCE	EXCEPTIONS
iv) Other pertinent documents	iv) Pertinent documents that are preserved in ERL logbooks or binders for future reference.	
5) Event Investigation a) Depending on their significance the format should include: i) Event Reconstruction (1) Develop chronological list (2) Include list of personnel involved ii) Event Analysis and Evaluation (1) Determine the response of equipment and personnel (2) Compare actual and expected responses (3) Determine adequacy of procedures and factors effecting performance (4) Compare event with prior events (5) Perform analysis to determine any detrimental effects that have occurred iii) Root-Cause Determination (1) Define casual factors that, if corrected, would preclude recurrence iv) Corrective Action Determination (1) Determine actions (2) Assign responsibility to implement the corrective actions. (3) Obtain final approval by Facility Manager. Can Include: (a) Changes in procedures (b) Training	5) Event Investigation a) The standard methods in Occurrence Reporting and Processing System (ORPS) ; Investigation of Incidents, Accidents and Injuries ; Critiques and Corrective and Preventive Action Subject Areas are used. i) These standard methods include event reconstruction ii) These standard methods include event analysis and evaluation iii) These standard methods include root cause determination iv) These standard methods include corrective action. Responsibilities to implement the corrective actions are formally assigned and approved by the Facility Manager, who is the C-AD Chair. The corrective actions are entered into the BNL Action Tracking System (ATS)	5) Event Investigation None.

GUIDELINE	PERFORMANCE	EXCEPTIONS
(c) Design Modifications (d) Change in administrative controls		
<p>6) Investigative Report</p> <p>a) Report should include:</p> <ul style="list-style-type: none"> i) Description of the event ii) Impact of the event iii) Root causes of the event iv) Lessons learned from the event v) Proposed corrective actions vi) Any positive aspects of the event (correct actions taken or planned) <p>b) The report should have the appropriate reviews and approvals</p>	<p>6) Investigative Report</p> <p>a) The C-AD uses the DOE ORPS reporting system and the requirements for Events/Issues Management in SBMS. Critiques are used for all events including those not meeting the ORPs thresholds for reporting to DOE. All corrective actions are tracked in the BNL or C-AD ATS. The format for reports follows requirements in the SBMS Subject Areas on Occurrences and Events/Issues Management. The ORPs form includes the topics listed in this Conduct of Operations guideline.</p> <p>b) ORPs reports and critiques require appropriate reviews and sign-offs as indicated in the relevant subject areas</p>	<p>6) Investigative Report</p> <p>None</p>
<p>7) Event Training</p> <p>a) Provide a mechanism to train personnel on aspects of the event in a timely fashion</p>	<p>7) Event Training</p> <p>a) Corrective actions requiring training are tracked by the BNL or C-AD ATS and are closed out during the first available training evolution, if practical. For corrective actions requiring immediate implementation, changes to procedures and appropriate training are performed prior to restart of the effected facility. Department personnel are informed on events through event and/or facility specific training and weekly meetings with C-AD Divisions. Relevant "lessons Learned" information is provided to C-AD personnel via the C-AD and/or BNL Lessons Learned Coordinator.</p>	<p>7) Event Training</p> <p>None</p>
<p>8) Event Trending</p> <p>a) Track patterns of deficiencies, such as operator errors and inadequate procedures.</p>	<p>8) Event Trending</p> <p>a) The C-AD trends events and occurrence reports as part of its Performance Indicator Program. Annually, events and occurrence report experience is reviewed with C-AD and BNL management at the Environmental Management, OSH management and Self Assessment Review.</p>	<p>8) Event Trending</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> b) Keep a summary of all events for review. 	<ul style="list-style-type: none"> b) Archival ORPS reports and critiques may be found at C-AD Critiques and C-AD ORPs Reports. ORPs reports are also maintained at the DOE website, Occurrence Reporting & Processing System (password required). 	
<ul style="list-style-type: none"> 9) Sabotage <ul style="list-style-type: none"> a) There should be an immediate investigation to: <ul style="list-style-type: none"> i) Ensure operability of safety systems ii) Decide if facility should be shutdown b) Minimize any impact of discovered sabotage and determine future actions 	<ul style="list-style-type: none"> 9) Sabotage <ul style="list-style-type: none"> a) Sabotage events are investigated by the BNL Safeguards and Security Division who may be reached at 2222 or 911 for emergencies and 2238 for non-emergencies. C-AD supports the investigation to the extent requested by BNL Safeguards and Security Division and DOE. b) ERL Operators and Physicists are trained to minimize the impacts of events including sabotage. BNL Safeguards and Security Division is notified of any suspected or actual sabotage event as soon as it is discovered. 	<ul style="list-style-type: none"> 9) Sabotage None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Notification Procedures</p> <p>a) Notification procedures should include:</p> <p>i) Designation of specific responsibilities for notifications</p> <p>ii) Identification of events and conditions requiring notifications</p> <p>iii) Identification of primary and alternate personnel to notify in various situations</p> <p>iv) Establishment of time requirements for notifications</p> <p>v) Definition of record-keeping requirements</p>	<p>1) Notification Procedures</p> <p>a) Notification procedures are as follows:</p> <p>i) Specific responsibilities for notifications at the C-AD are designated in procedures. For example, OPM 10.1, "Occurrence Reporting and Processing of Significant Operations Information" and OPM 2.8, "Shift Turnover."</p> <p>ii) Events and conditions requiring notifications at the C-AD are specified in procedures. For example OPM 10.1 and OPM XXX, "ERL Operations Shift Turnover."</p> <p>iii) The identities of primary and alternate personnel to notify in various situations are specified in procedures. For example, OPM 10.1 and OPM 12.5, "Emergency Notification List."</p> <p>iv) The establishment of time requirements for notifications is specified in OPM 10.1</p> <p>v) Record-keeping requirements are defined in OPM 10.1 for occurrences and OPM 13.4.1, "Records Management" for all C-AD records</p>	<p>1) Notification Procedures</p> <p>None</p>
<p>2) Notification Responsibility</p> <p>a) Operations supervisor has ultimate responsibility for notifications</p>	<p>2) Notification Responsibility</p> <p>a) The on-duty Operators and Physicists or the appropriate C-AD supervisor has the responsibility for notifications, see OPM 10.1</p>	<p>2) Notification Responsibility</p> <p>None</p>
<p>3) Names & Phone Numbers</p> <p>a) Include primary and alternate names with phone numbers and pager numbers in a readily accessible place</p>	<p>3) Names & Phone Numbers</p> <p>a) The call list is maintained for the C-AD Department in OPM 10.1.a, "Occurrence Notification Call List"</p>	<p>3) Names & Phone Numbers</p> <p>None</p>
<p>4) Documentation</p> <p>a) Maintain record of notifications</p>	<p>4) Documentation</p> <p>a) The C-AD notifications for occurrences are maintained in ORPS records. Also, C-AD maintains records of notifications in operations logs.</p>	<p>4) Documentation</p> <p>None</p>
<p>5) Communication Equipment</p> <p>a) Provide adequate equipment to address communication requirements</p>	<p>5) Communication Equipment</p> <p>a) The C-AD has teleconference, video-conference, radios, plectrons, public-address systems, internet, modems, fax, e-mail, wireless phone, beeper, and standard phone services</p>	<p>5) Communication Equipment</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Status Change Authorization and Reporting</p> <ul style="list-style-type: none"> a) Operations supervisor is responsible for proper configuration and any changes b) Operations Supervisor must be the focal point of shift operations c) Authority for some minor changes may be delegated, but Operations Supervisor should remain informed d) Good communication should be maintained between Operators and Operations Supervisor e) Status changes should have the proper authorization and should be communicated to the operators 	<p>1) Status Change Authorization and Reporting</p> <ul style="list-style-type: none"> a) Authorization is defined in OPM 1.1 "Authorization." The ERL Operations Supervisor is responsible for proper configuration and any changes. b) The ERL Operator-in-Charge is the focal point for shift operations; see OPM Chapter 2, "Guidelines for the Conduct of Operations" c) Shift organizations have authority for changes; however, the Operations in charge is kept informed. Operators and Physicists are required to document changes to accelerator devices in the ERL Operations Log Book, and ERL Operation Group Log Sheets, see OPM 1.2, "C-AD Documents," and in computer generated reports. ERL changes are documented per OPM XXX, "Operations Reporting and LogBooks." d) Operators and Physicists are located together in the ERL Control Room to ensure information flow. A communication protocol between the C-AD MCR, Cryogenic Watch, System Experts, CAS and the ERL Control Room has been established. e) Individuals who authorize status changes report these changes to the ERL Control Room. For example, see OPM XXX, "Communication Of System Status To The Operations in charge." 	<p>1) Status Change Authorization and Reporting</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>2) Equipment & Systems Alignment</p> <p>a) Check systems for proper alignment before placing them in operation</p> <p>b) Use alignment checklists to aid operators</p> <p>c) Include the proper nomenclature in the checklists, and have lists signed off at each step</p> <p>d) Check equipment in accordance with technical specifications and operational limits for start-up situations and after maintenance</p> <p>e) Maintain checklists for review and analysis</p>	<p>2) Equipment & Systems Alignment</p> <p>a) Initial system alignment checklists are given in OPM Chapter XX , “ERL Equipment Startup Procedures (pre-beam).” Radiation Safety Check-off Lists, OPM 9.1.2, are used to ensure outstanding radiation safety issues are closed out prior to operations. Experimental Safety Committee and Accelerator Safety System Committee Check-off Lists, OPM 9.2.4 and OPM 9.3.2, are used to ensure outstanding conventional safety issues are closed out prior to experiment or accelerator system startup. ERL equipment configuration is recorded in logbooks per procedures in OPM Chapter XX.</p> <p>b) Checklist for specific equipment and tasks are documented in OPMs. Search the operations procedures for checklists, aids, lists, etc.</p> <p>c) ERL Operators and Physicists use the proper nomenclature for the accelerator complex. Terminology is found in OPM 1.2, “Documents,” and used in procedures such as those found in OPM Chapter XX, “Detailed ERL System Procedures,” and in OPM Chapter 4, “Access Security Procedures.” Sign-off steps are included.</p> <p>d) Accelerators do not employ “technical specifications” like nuclear facilities but have similar requirements in “Accelerator Safety Envelopes”; there are permissible operating ranges for specific certified equipment; for example, OPM 9.2.3, and the C-AD operates within ASE requirements which are translated into OPMs in OPM 2.5.4. Operational Safety Limits are reviewed periodically and when major changes are proposed to the ERL configuration or operations.</p> <p>e) Records of initial ERL system alignments are maintained for review and analysis by the ERL Operations Supervisor</p>	<p>Equipment & Systems Alignment None</p>
<p>3) Equipment Locking and Tagging</p> <p>a) All personnel should have training on responsibilities for locking and tagging and on manipulation of locks and tags</p>	<p>3) Equipment Locking and Tagging</p> <p>a) Equipment locking and tagging are covered for example in OPM 2.36, “Lock and Tag Program for Control of Hazardous Energy,” OPM XXX, “Lockout/Tagout Procedure for Personnel Entry into the ERL Ring Cave,” OPM XXX “Lockout/Tagout Procedure for ERL Main Power Supplies,” and OPM 9.1.16 “Lockout/Tagout For Radiation Safety.” All appropriate ERL personnel have been trained in these procedures. These procedures are consistent with SBMS requirements. All appropriate persons have been trained in these standards.</p>	<p>3) Equipment Locking and Tagging None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>4) Operational Limits Compliance</p> <ul style="list-style-type: none"> a) Compliance with operational limits should be documented b) Documentation should include logs, status sheets, and checklists c) Operations personnel should be apprised of requirements of operational limits d) Compliance with limit should be reviewed 	<p>4) Operational Limits Compliance</p> <ul style="list-style-type: none"> a) Operational safety limits (OSL) have been established and documented in procedures (OPM Chapter 2) b) Logs, status sheets, and checklists are used to help ensure compliance. Search the operations procedures for checklists, logs, status sheets, etc. c) Operators, Operations Supervisor, Physicists, Access Controls Groups and other relevant ERL support personnel are trained in the ERL ASE procedure. d) Compliance with specific limits is reviewed; e.g., the ASE for energy flux is tracked periodically. Periodic management assessments (OPM 13.10.1, "Independent Assessment") are also used to review compliance with the ASE. 	<p>5) Operational Limits Compliance None</p>
<p>5) Equipment Deficiency Identification & Documentation</p> <ul style="list-style-type: none"> a) Methods to identify, document, communicate, and control deficiencies should be established. 	<p>5) Equipment Deficiency Identification & Documentation</p> <ul style="list-style-type: none"> a) Equipment deficiencies are identified and communicated via the ERL Logbook (OPMXXX). Controlling equipment deficiencies is via use of Lock-out Tag-out or Do Not Operate Tags, and both these control systems are covered by written procedures. ERL equipment problems, which do not impact the complex, are documented as defined in OPM 12.10, "Operations Reporting and Log Books." 	<p>5) Equipment Deficiency Identification & Documentation None</p>
<p>6) Work Authorization and Documentation</p> <ul style="list-style-type: none"> a) Operations Supervisor should document and authorize all activities which effect operations, safety, or change the control of alarms b) Documentation of work in progress should be available for review 	<p>6) Work Authorization and Documentation</p> <ul style="list-style-type: none"> a) Permit systems for activities affecting fire alarm, fire protection, radiation safety, radiation alarms, access control, ODH hazard control, digging, enhanced work control, welding and cutting and electrical safety are in use at C-AD. The Maintenance Coordinator, working with the ERL Operations Supervisor documents scheduled maintenance activities and operations personnel are notified. All work is documented in formal work control system. See OPM 2.28, "Work Planning and Control for Operations" and OPM 2.29, "Procedure for Enhanced Work Planning for Experimenters." b) Work in progress is tracked and documented by Supervisors and the Maintenance Coordinators, and is available for review by looking at local work-control-system records 	<p>6) Work Authorization and Documentation None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>7) Equipment Post-Maintenance Testing & Return to Service</p> <p>a) Equipment should be tested after maintenance to demonstrate its proper operation</p> <p>b) Testing should be documented</p>	<p>7) Equipment Post-Maintenance Testing & Return to Service</p> <p>a) Equipment is returned to service in accord with procedures and work controls. Post-maintenance testing and return-to-work formalities are documented for safety significant structures, systems and components. The alarm panel lights are periodically tested for all consoles in the ERL Control Room. Deficiencies are repaired prior to operations.</p> <p>b) Testing is documented in accordance with applicable procedures and work controls</p>	<p>7) Equipment Post-Maintenance Testing & Return to Service</p> <p>None</p>
<p>8) Alarm Status</p> <p>a) Status and control and alarm panels should be available and include information on:</p> <p>b) Alarms which have been disabled</p> <p>c) Inputs which have been disabled</p> <p>d) Alarms with set-point changes</p> <p>e) Actions of alarms with multiple inputs</p> <p>f) Appropriate actions should be taken to unmask simultaneous alarms from multiple sources</p>	<p>8) Alarm Status</p> <p>a) The ERL Control Room is arranged such that there are appropriate control consoles for operations, monitoring and recording the actions of the access-control and fire alarm systems. The status of radiation monitor alarms is readily available to all operations personnel from any console. Similar controls and alarm panels are in the CAS Building.</p> <p>b) Critical alarms cannot be disabled, or set points changed, by operations personnel</p> <p>c) Radiation monitor alarm inputs may not be disabled by operators, and if disconnected an alarm sounds</p> <p>d) Safety related audible alarms cannot be adjusted to different set points or different sound levels</p> <p>e) Actions by ERL operators in response to multiple radiation monitor alarms are documented in OPM XXX, "Responding to Chipmunk Interlocks", and OPM XXX, "Responding to Chipmunk Alarms"</p> <p>f) Simultaneous alarms are unmasked by the system and multiple radiation-monitor alarms are conspicuous</p>	<p>8) Alarm Status</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>9) Temporary Modification Control</p> <p>a) Provide administrative controls for temporary changes in configuration and procedures</p> <p>b) Controls should provide the following:</p> <p>i) Technical oversight</p> <p>ii) Formal approvals</p> <p>iii) Safety reviews</p> <p>iv) Installation approval</p> <p>v) Independent verification of installation or removal</p>	<p>9) Temporary Modification Control</p> <p>a) Administrative controls for temporary modifications are the norm. ERL is constantly under development since it is an R&D accelerator system. Safety significant systems, for example, are modified according to OPM Chapter 4, "Access Security Procedures." Non-safety systems are modified according to quality assurance procedures in the OPM Chapter 13. A temporary procedure system and a hand-processed procedure-change system are used to control changes to existing procedures.</p> <p>b) Formal controls and procedures provide the following:</p> <p>i) Technical oversight is provided via reviews conducted by the Chief Engineers, the Radiation Safety Committee, the Experimental Safety Review Committee, the Accelerator Systems Safety Review Committee, the ALARA Committee and the system experts.</p> <p>ii) Formal approval systems are used such as the Radiation Safety Checkoff List (OPM 9.1.2), Experimental Safety Checkoff List (OPM 9.2.4), or Certification by Chief Engineers (OPM 9.2.3).</p> <p>iii) Safety and environmental protection reviews are performed as follows: The Accelerator Systems Safety Review Committee reviews new accelerator systems. The Experimental Safety Review Committee reviews experiments. The BNL Cryogenic Safety Committee reviews cryogenic systems. All major operations and experiments are reviewed for radiation protection by the Radiation Safety Committee and for dose reduction by the ALARA Committee. NEPA reviews are performed according to SBMS requirements and specific jobs are reviewed for safety via the work planning program.</p> <p>iv) Experiments are approved by the Department Chair prior to each running period. See OPM 9.2.4, "Procedure for Preparing an ESRC Checkoff List and for Assuring Recommendations are Completed." The ERL Operations Supervisor and the Head of the Collider Accelerator Support Group, prior to initial startup, approve new accelerator systems. See OPM 2.27.a, "Operations Acceptance of New and Modified Equipment/Systems Checklist."</p> <p>v) Independent verification of installation or removal of the access control system or shielding is performed by the Radiation Safety Committee.</p>	<p>9) Temporary Modification Control None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> vi) Documentation of modification vii) Updating of operating procedures viii) Training in modifications ix) Periodic audits of outstanding modifications 	<p>Fire alarm/protection system installation and removal is controlled by BNL support organizations. The Chief Electrical Engineer or his designate independently verify electrical safety systems such as Kirk Keys.</p> <ul style="list-style-type: none"> vi) Documentation associated with modifications is retained in accord with OPM procedures vii) Updating of temporary operating procedures is controlled in OPM 1.4.4 "Procedure for Implementing or Canceling Temporary Procedures" viii) Training requirements are defined in the temporary procedure itself ix) Temporary procedures are reviewed by the ERL Operations Supervisor, and are removed or converted to permanent procedures. The Radiation Safety Committee periodically reviews temporary modifications to safety significant equipment, such as interlock bypasses. 	
<ul style="list-style-type: none"> 10) Distribution & Control of Equipment & Systems Documents <ul style="list-style-type: none"> a) Provide system for distribution of controlled documents 	<ul style="list-style-type: none"> 10) Distribution & Control of Equipment & Systems Documents <ul style="list-style-type: none"> a) OPM Chapter 1 procedures, OPM 13.6.2, "Configuration Management" and OPM 13.4.1 "Records Management" provide for control of plans, procedures, engineering specifications and drawings 	<ul style="list-style-type: none"> 10) Distribution & Control of Equipment & Systems Documents None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Lockout/Tagout Use</p> <p>a) Definitions</p> <p>b) <u>Lockout</u> is the placement of a lock to render a device inoperable</p> <p>c) <u>Tagout</u> is the application of a warning device on a control indicating the control must not be used when the tag is removed by authorized persons</p> <p>d) Use of keys should be controlled</p>	<p>1) Lockout/Tagout Use</p> <p>a) SBMS Subject Areas Electrical Safety and Lockout/Tagout provides definitions for use of Lockout and Tagout devices. C-AD procedures OPM 1.5, "Electrical Safety Implementation Plan," and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" comply with these BNL Standards.</p> <p>b) Lockout at C-AD is the placement of a lock to render a device inoperable</p> <p>c) Tagout at C-AD is the application of a warning device on a control</p> <p>d) Lockout keys are controlled; OPMs XXX, XXX ...and 9.1.16 are examples of C-AD procedures that provide lockout and tagout instructions for ERL specific systems</p>	<p>1) Lockout/Tagout Use None</p>
<p>2) Lockout and Tagout Implementation</p> <p>a) If an isolating device can be locked out, then it should be locked out</p> <p>b) If an isolating device can not be locked out, it should be tagged out</p> <p>c) If major modifications to equipment are made, the addition of lock out capability should be considered</p> <p>d) The following are example administrative controls:</p> <p>i) Generate a list of devices that must be locked out</p> <p>ii) Establish criteria for locking out</p>	<p>2) Lockout and Tagout Implementation</p> <p>a) The C-AD uses locks wherever locks can possibly be applied, or where locks can be retrofitted for the purpose of isolating devices</p> <p>b) Tagouts are used at C-AD if a device cannot be locked out</p> <p>c) New and modified installations are fitted with lockouts in accord with SBMS requirements. See OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy", section 5.2.7.</p> <p>d) The C-AD uses the following administrative controls:</p> <p>i) Lists of devices that must be locked out. See, for example, OPM XXX, "ERL Cave Lockout-Tagout Checklist – CONTROLLED ACCESS."</p> <p>ii) Written criteria for lockout. See, for example, OPM 9.1.16 "Lockout / Tagout for Radiation Safety."</p>	<p>2) Lockout and Tagout Implementation None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> iii) Control the distribution of and access to keys iv) Specify techniques for verifying the position of locked components v) Document when the position of normally locked component is changed vi) Perform periodic checks of locked components 	<ul style="list-style-type: none"> iii) Controls for the distribution and access of keys. See OPM XXX, "Keys Required to Access ERL Primary Beam Enclosure," and OPM , "Lockout Tagout Procedure for ERL Klystron Room Entry," for examples iv) Care is taken to employ only the proper test equipment to verify that the system is safe; only persons trained to use test equipment conduct the verification. See SBMS Subject Area, Lockout/Tagout. v) Documentation is associated with specific lockout and tagout procedures. See, for example, OPM XXX, "ERL Cave Lockout-Tagout Checklist – CONTROLLED ACCESS." vi) The requirements for periodic checks are given in OPM 1.5, "Electrical Safety Implementation Plan," and OPM 13.10.1, "Independent Assessment." In addition Tickler Card #303 used by the ESHQ Division ensures that annual checks of LOTO are performed as per 29CFR1910.147(c)(6)(i) and (ii). 	
<ul style="list-style-type: none"> 3) Protective Materials and Hardware <ul style="list-style-type: none"> a) Includes locks, tags, and chains b) Lockout and Tagout devices should be singularly identified, and meet the following: <ul style="list-style-type: none"> i) Able to withstanding the environment in which they are installed ii) Standardized in size, shape, or color iii) Substantial enough to prevent removal (50# pull minimum) iv) Carry the name of the person applying the device v) Carry a "Warning" notice 	<ul style="list-style-type: none"> 3) Protective Materials and Hardware <ul style="list-style-type: none"> a) LOTO materials include standardized locks and tags. See SBMS Subject Area, Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy." b) Locks and tags are singularly identified, and at C-AD they meet the following requirements: <ul style="list-style-type: none"> i) Able to withstanding the environment in which they are installed ii) Standardized in size, shape, or color iii) Substantial enough to prevent removal (50# pull minimum) iv) Carry the name of the person applying the device v) Carry a "Warning" notice 	<ul style="list-style-type: none"> 3) Protective Materials and Hardware None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>4) Lockout/Tagout Program</p> <p>a) Establish procedures for the program</p>	<p>4) Lockout/Tagout Program</p> <p>a) SBMS Subject Areas Electrical Safety and Lockout/Tagout establishes the BNL Lockout/Tagout program requirements for all Departments and Divisions. OPM 1.5, "Electrical Safety Implementation Plan," and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy", which meet Laboratory requirements, is used by C-AD for Department specific Lockout/Tagout instructions</p>	<p>4) Lockout/Tagout Program</p> <p>None</p>
<p>5) Procedures for Lockout/Tagout</p> <p>a) Procedures should include, but are not limited to following:</p> <p>i) Statement of intended use</p> <p>ii) Specific steps for placing, removing and transferring of tags and locks</p> <p>iii) Testing requirements to verify the isolation of the energy source</p> <p>b) Specific procedures are not required when all the following requirements are:</p> <p>i) Machine has no stored energy after shutdown</p> <p>ii) Machine has a single, easily identifiable energy source</p> <p>iii) Isolation of the source will completely de-energize the machine</p> <p>iv) Machine is isolated from the energy source and locked out</p> <p>v) A single lockout device only is required</p> <p>vi) Lockout is under the exclusive control of authorized personnel</p>	<p>5) Procedures for Lockout/Tagout</p> <p>a) C-AD LOTO-specific procedures, for example OPM XXX "Lockout/Tagout Procedure for Personnel Entry into the ERL Cavexxx," include:</p> <p>i) Statement of intended use</p> <p>ii) Specific steps for placing, removing and transferring of tags and locks</p> <p>iii) Testing requirements to verify the isolation of the energy source</p> <p>b) Personnel applying LOTO not covered by a specific C-AD procedure follow the BNL procedure in SBMS Subject Area Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy." These procedures require following the operational guidelines of 5 b) i through 5 b) viii.</p>	<p>5) Procedures for Lockout/Tagout</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> vii) Servicing does not create a hazard to other personnel viii) Employer has a good accident record on the use of Lockout/Tagout c) Documentation of Lockout/Tagout Usage should be documented and periodically reviewed 	<ul style="list-style-type: none"> c) Documentation of lockouts and tagouts is via LOTO logbooks which are periodically reviewed by supervisors. See OPM 1.7, "Supervisory Practice for Working with Hazards," and OPM 13.10.1, "Independent Assessment." In addition Tickler Card #303 used by the ESHQ Division ensures that annual checks of LOTO are performed as per 29CFR1910.147(c)(6)(i) and (ii). 	
<ul style="list-style-type: none"> 6) Application of Lockout/Tagout <ul style="list-style-type: none"> a) The program should cover the following procedures: <ul style="list-style-type: none"> i) Preparation for Shutdown <ul style="list-style-type: none"> (1) Inform affected personnel of hazards and of controls to be used ii) Machine or Equipment Shutdown <ul style="list-style-type: none"> (1) Use established procedures iii) Equipment Isolation <ul style="list-style-type: none"> (1) Apply the lockout or tagout device iv) Affixing Locks/Tags <ul style="list-style-type: none"> (1) Securely affix tags with qualified personnel v) Stored Energy <ul style="list-style-type: none"> (1) Render safe any stored energy and prevent any re-accumulation 	<ul style="list-style-type: none"> 6) Application of Lockout/Tagout <ul style="list-style-type: none"> a) The C-AD has formal programs and procedures to: <ul style="list-style-type: none"> i) Prepare for Shutdown <ul style="list-style-type: none"> (1) Personnel are informed during scheduled weekly meetings of hazards and controls to be used in a shutdown. See OPM 2.28.a, "C-A Weekly Meetings Diagrams and Table." ii) Machine or Equipment Shutdown <ul style="list-style-type: none"> (1) See for example ERL shutdown procedure OPM XXX, "ERL Shutdown," and OPM XXX, "Shut Down Before Power Outage" iii) Equipment Isolation <ul style="list-style-type: none"> (1) C-AD has specific LOTO procedures to isolate specific devices. See, for example, OPM XXX, "ERL Cave Lockout-Tagout Checklist – CONTROLLED ACCESS." iv) Affix Locks/Tags <ul style="list-style-type: none"> (1) Only trained and qualified personnel are allowed to affix LOTO tags. See OPM 1.5, "Electrical Safety Implementation Plan," and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" v) Stored Energy <ul style="list-style-type: none"> (1) Stored energy is rendered safe. For example, large vacuum windows are covered prior to work on or near the window and 	<ul style="list-style-type: none"> 6) Application of Lockout/Tagout None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>vi) Verification of Isolation (1) Before starting work, verify isolation of the device</p> <p>vii) Release from Lockout/Tagout (1) Before restoring equipment, perform the following:</p> <p>(a) Equipment/Workspace (i) Machine or equipment is operationally intact (ii) Inspect area and remove non essential items (iii) Person removing the tag/lock should assure that the equipment is properly aligned</p> <p>(b) Personnel (i) Check that affected personnel are safe and are informed of energization</p> <p>(c) Lockout/Tagout Device Removal (i) The person who applied the isolation device shall be the one to remove it</p>	<p>capacitors are shorted to prevent re-accumulation of energy.</p> <p>vi) Verification of Isolation (1) Personnel are trained to verify isolation of devices before work begins. See SBMS Subject Area Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy".</p> <p>vii) Release from Lockout/Tagout (1) Before restoring equipment, personnel are trained in SBMS Subject Area Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" to ensure:</p> <p>(a) Equipment/Workspace (i) Machine or equipment is operationally intact (ii) The area is inspected and non essential items are removed (iii) The equipment is properly aligned</p> <p>(b) Personnel (i) That affected personnel are safe and are informed of energization.</p> <p>(c) Lockout/Tagout Device Removal (i) That the person who applied the isolation device is the one to remove it (ii) That removal of tags is documented</p>	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> (ii) Document removal of tag via logbook or other methods (d) Procedures for removal by a person other than who placed the device: <ul style="list-style-type: none"> (i) Verify that the person who placed device is not available (ii) Make reasonable efforts to inform the person who placed the device that it has been removed (iii) Ensure that the affected personnel are informed 	<ul style="list-style-type: none"> (d) Procedures such as OPM 2.14, "Removal of Locks and Tags by Others" ensure: <ul style="list-style-type: none"> (i) That the unavailability of the person who placed device is verified (ii) That reasonable effort is made to inform the person who placed the device that it has been removed (iii) That the affected personnel are informed 	
<ul style="list-style-type: none"> 7) Testing or Positioning of Equipment or Components <ul style="list-style-type: none"> a) When a temporary removal is required: <ul style="list-style-type: none"> i) Clear the equipment of tools and materials ii) Ensure that personnel leave from the area iii) Remove the lockout/tagout device iv) Perform testing to assure lockout v) De-energize and reapply the lockout/tagout device 	<ul style="list-style-type: none"> 7) Testing or Positioning of Equipment or Components <ul style="list-style-type: none"> a) For temporary removal of LOTO, the specific procedure steps would include the following where appropriate: <ul style="list-style-type: none"> i) Clear the equipment of tools and materials ii) Ensure that personnel leave from the area iii) Remove the lockout/tagout device iv) Perform testing to assure lockout v) De-energize and reapply the lockout/tagout device 	<ul style="list-style-type: none"> 7) Testing or Positioning of Equipment or Components None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>8) Periodic Inspections</p> <p>a) Perform audit for compliance with program</p>	<p>8) Periodic Inspections</p> <p>a) C-AD performs self-assessments and audits of its LOTO program. See OPM 1.7, "Supervisory Practice for Working With Hazards". Additionally, the C-AD QA Office performs routine audits of LOTO programs. See OPM 13.10.1, "Independent Assessment" and Tickler Card #303 used by the ESHQ Division which ensures that annual checks of LOTO are performed as per 29CFR1910.147(c)(6)(i) and (ii).</p>	<p>8) Periodic Inspections None</p>
<p>9) Caution Tags</p> <p>a) Do not use for personnel protection</p> <p>b) Tags should show:</p> <p>i) Tag identification system</p> <p>ii) Information on any precautions</p> <p>iii) Signature of person applying the tag</p> <p>c) Keep records of use</p> <p>d) Apply so that the tag does not interfere with operation of equipment</p>	<p>9) Caution Tags</p> <p>a) The use of Do Not Operate Tags and Caution Tags is described in OPM 2.13 "Use of Do Not Operate and Caution Tags for Equipment and Systems:" They are not used for personnel protection.</p> <p>b) Tags show:</p> <p>i) Tag identification system</p> <p>ii) Information on any precautions</p> <p>iii) Signature of person applying the tag</p> <p>c) OPM 2.13 is the record of use</p> <p>d) Personnel are trained to ensure the tag does not interfere with operation of equipment</p>	<p>9) Caution Tags None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>10) Training and Communication</p> <p>a) Training should include:</p> <p>i) Recognition of hazards</p> <p>ii) Purpose of procedures</p> <p>iii) Recognition of the Tagout/Lockout devices</p> <p>b) Training on limitations of tags:</p> <p>i) Tags are warning device only, with no physical protection</p> <p>ii) Tags should be removed by the person who applied them</p> <p>iii) Tags must be legible</p> <p>iv) Tags must withstand environment</p> <p>v) Tags must be securely attached</p> <p>c) Training on limitation of locks:</p> <p>i) Locks may hinder facility systems necessary for safety</p> <p>d) Retraining:</p> <p>i) Provide when there is a change in job, equipment, or hazard</p>	<p>10) Training and Communication</p> <p>a) BNL Web Courses (Electrical Safety I and LOTO) and C-AD facility specific training include:</p> <p>i) Recognition of hazards</p> <p>ii) Purpose of procedures</p> <p>iii) Recognition of the Tagout/Lockout devices</p> <p>b) Personnel are trained on the limitations of tags as follows:</p> <p>i) Tags are warning device only, with no physical protection</p> <p>ii) Tags should be removed by the person who applied them</p> <p>iii) Tags must be legible</p> <p>iv) Tags must withstand environment</p> <p>v) Tags must be securely attached</p> <p>c) Training on the limitations of locks is as follows:</p> <p>i) Personnel are trained that locks may hinder facility systems necessary for safety</p> <p>d) Retraining requirements are as follows:</p> <p>i) C-AD requires retraining whenever there is a change in job classification. C-AD requires specific LOTO training for specific C-AD equipment. Following initial training, individuals are retrained annually to general LOTO requirements and LOTO specific devices. Electrical Safety I retraining is required every two years.</p>	<p>10) Training and Communication</p> <p>None</p>
<p>11) Lockout or Tagout Implementation</p> <p>a) Implementation shall be by authorized, qualified personnel only</p>	<p>11) Lockout or Tagout Implementation</p> <p>a) Implementation is by authorized, qualified personnel only. Trained and qualified personnel are listed in BTMS.</p>	<p>11) Lockout or Tagout Implementation</p> <p>None</p>
<p>12) Notification of Personnel</p> <p>a) Notify appropriate supervisors or other personnel when lockout/tagout devices are applied or removed</p>	<p>12) Notification of Personnel</p> <p>a) LOTO establishes generic notification requirements. C-AD procedures establish specific notification requirements.</p>	<p>12) Notification of Personnel</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>13) Outside Contractors</p> <p>a) Plant and contractor personnel should inform each other of their requirements</p>	<p>13) Outside Contractors</p> <p>a) LOTO establishes the responsibilities of visitors and contract employees not under C-AD supervision. Outside Departments working at C-AD are subject to requirements in OPM 1.11 "BNL Departments and Outside Service Provider Requirements for Interaction with C-A." Outside contractors under C-AD supervision and working at C-AD are subject to requirements in C-AD OPM 1.12 "Training and Qualification Plan."</p>	<p>13) Outside Contractors None</p>
<p>14) Group Lockouts</p> <p>a) Procedures must be developed for crews equivalent to procedures for personnel Lockout/Tagout</p>	<p>14) Group Lockouts</p> <p>a) SBMS Subject Area Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" establish generic group lockout requirements. C-AD procedure OPM XXX, "Lockout/Tagout Procedure for Personnel Entry into ERL Cave" establishes the group lockout requirements for the ERL.</p>	<p>14) Group Lockouts None</p>
<p>15) Shift or Personnel Changes</p> <p>a) Procedures should be developed to assure the continuity of Lockout/Tagout protection between personnel or shifts</p>	<p>15) Shift or Personnel Changes</p> <p>a) SBMS Subject Area Lockout/Tagout and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" establish generic shift and personnel change procedures for lockout/tagout. These requirements are included in C-AD procedures.</p>	<p>15) Shift or Personnel Changes None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Components Requiring Independent Verification</p> <p>a) Components that ensure safe and reliable operation, as determined by safety analysis, should receive independent analysis in accordance with the following requirements:</p> <p>b) Credited Safety Systems</p> <p>i) Not required if:</p> <p>(1) Mispositioning would not affect the system performance</p> <p>(2) Mispositioning would be immediately known to operator</p>	<p>1) Components Requiring Independent Verification</p> <p>a) Credited safety structures, systems and components at the ERL accelerator complex receive independent analysis in accordance with the following requirements</p> <p>b) Safety-related systems include relay based access control system (ACS), PLC based access control system (PASS), radiation shielding and beam dumps, radiation monitor system and the ODH monitoring system, which are independently reviewed by the C-AD Radiation Safety Committee since mispositioning would affect the system performance. Kirk Key systems for electrical safety and other personal safety are reviewed by the Accelerator Systems Safety Review Committee and the Experimental Safety Review Committee.</p> <p>i) Independent verification is required at C-AD:</p> <p>(1) Fire suppression and alarm systems are acceptance tested by Plant Engineering Fire Alarm Technicians following installation; however, mispositioning of this system does not effect accelerator performance</p> <p>(2) Mispositioning of safety significant systems would not necessarily be apparent to operators or physicists; although indicators for the access control system are displayed in the ERL Control Room. The access control systems have dual, independent and fail safe devices that are used to block beams or switch beams off and independent functional verification of these devices is performed every year by the C-AD Access Controls Group. See for example, OPM XXX, "Access Control – Annual Acceptance Tests for ERL." The position and thickness of shielding and beam dumps is independently verified by fault studies after construction, fault studies that are performed by the C-AD Radiation Safety Committee. See OPM 9.1.9, "Fault Study Procedure for Primary and Secondary Areas." The response of the radiation monitor system is independently verified by the technicians from the</p>	<p>1) Components Requiring Independent Verification</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>(3) Independent verification would involve significant radiation exposure</p> <p>c) Non-Safety Related Systems</p> <p>i) Independent verification would be appropriate if mispositioning could lead to unplanned shutdowns, challenges to safety systems, or cause the release of radioactive or hazardous material.</p>	<p>Radiological Controls Division assigned to C-AD and the C-AD Access Controls Group prior to each running period see ??? OPM 8.15.4, "Procedure for a Functional Test of the Chipmunk Computer Interface." Kirk Key electrical safety systems are installed and tested under the purview of the Chief Electrical Engineer.</p> <p>(3) Independent verification does not involve significant radiation exposure at ERL. The accelerator can be shut-down for testing of safety significant systems and testing does not require one to enter areas where there are excessive residual radiation levels.</p> <p>c) Non-safety related systems where independent verification is appropriate include beam loss monitoring systems, water cooling systems, and cryogenic systems</p> <p>i) Liaison physicists review the response of beam loss monitoring ??? systems during running periods. The Water Systems Group monitors cooling systems for leaks. Water detection mats and secondary containments are used, and any tritiated cooling water system pressures are monitored and alarmed. Response to alarms for tritiated water leaks is covered by procedure OPM 10.2, "Response to Tritiated Water Spills." Cryogenic operators monitor system pressures, temperatures and valve positions continuously during operations, see OPM XXX, "Cryogenic Operations at ERL."</p>	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>2) Occasions Requiring Independent Verification</p> <ul style="list-style-type: none"> a) Returning equipment to service after maintenance b) Removing equipment from service c) Periodic checks during normal operation 	<p>2) Occasions Requiring Independent Verification</p> <ul style="list-style-type: none"> a) Equipment startup procedures cover check out or start up of systems. See OPM Chapter XXX, "ERL Equipment Startup Procedures." New equipment is verified for service via OPM 2.27, "Release of New and Modified Equipment/Systems to Operations." b) Equipment shutdown procedures include for example OPM XXX, "ERL Beam Transport Shutdown." At times, independent verification of an RSLOTO is required. See OPM 9.1.16, "Lockout/Tagout for Radiation Safety." c) Periodic checks during normal operations are made by the Operators and Physicists assisted by CAS Watch personnel and by the Radiological Control Technicians 	<p>2) Occasions Requiring Independent Verification</p> <p>None</p>
<p>3) Verification Techniques - General Guidelines</p> <ul style="list-style-type: none"> a) Independence <ul style="list-style-type: none"> i) Should be conducted in a manner to identify the component, its required position and actual position b) Remote Position Indicators <ul style="list-style-type: none"> i) Perform check local to the device, unless precluded by ALARA c) Process Parameters <ul style="list-style-type: none"> i) Should not be used as the only indication of a components' position. A review should be made to determine when these parameters would be acceptable d) Throttled Valves 	<p>3) Verification Techniques - General Guidelines</p> <ul style="list-style-type: none"> a) Independence <ul style="list-style-type: none"> i) Specific examples of independent verification techniques may be found throughout the OPM. For example, see attachments to procedure OPM, "Procedure for Lockout/Tagout of ERL" that require two operators to identify the component and its position b) Remote Position Indicators <ul style="list-style-type: none"> i) Position indicators are checked local to the device. For example, access control gates are reset locally after an area is swept clear of people in order to enable the access control system to allow beam into the ERL accelerator c) Process Parameters <ul style="list-style-type: none"> i) Process parameters, such as radiation monitor set points for alarm in the ERL Control Room or for interlocking the beam, are reviewed by C-AD Radiation Safety Committee. See OPM 8.15.3, "Chipmunk Radiation Monitors." Other safety significant parameters are reviewed by Chief Engineers; see OPM 9.2.3 "Procedure for Chief Engineers to Certify Conformance of Devices." 	<p>3) Verification Techniques - General Guidelines</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> i) Position indicators should be used in conjunction with observing the actions of valve actuator to proper verification e) Surveillance Testing <ul style="list-style-type: none"> i) Independent verification should be used only when proven to satisfy independent verification requirements f) Operation Self-Appraisal and Verification <ul style="list-style-type: none"> i) Should be performed periodically to ensure that the ES&H considerations, and operations functions are being conducted in accordance with established criteria 	<ul style="list-style-type: none"> d) Throttled Valves <ul style="list-style-type: none"> i) Position indicators are used in conjunction with observing the actions of valve actuators; for example, see OPM XXX, "ERL Helium Refrigerator Cooldown" e) Surveillance Testing <p>C-AD programs satisfy BNL institutional requirements in SBMS Integrated Assessment</p> f) Operation Self-Appraisal and Verification <ul style="list-style-type: none"> i) Operation self-appraisal and verification are performed periodically; see OPM 13.10.1, "Independent Assessment." 	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Establishment of Operating Logs</p> <p>a) Logs should be established for all key control points including operations supervisor, and control room operator</p> <p>b) Provide narrative sections on round sheets when logs are not used at a particular control point</p>	<p>1) Establishment of Operating Logs</p> <p>a) Logs are maintained for all key positions, See ??? OPM 1.2, "C-AD Documents." Also see the Accelerator Division Operations Web.</p> <p>b) Narrative sections are provided on round sheets where appropriate. For example, see OPM XXX, "ERL Cave Sweep Checklist." Also see the Accelerator Division Operations Web</p>	<p>1) Establishment of Operating Logs None</p>
<p>2) Timeliness of Recordings</p> <p>a) Log information should be recorded as soon as possible to prevent inaccuracies.</p>	<p>2) Timeliness of Recordings</p> <p>a) Operations logbooks are completed as events progress but in no case later than the end of each shift see ??? OPM 2.7, "Logkeeping," section 2.2.</p>	<p>2) Timeliness of Recordings None</p>
<p>3) Information to be Recorded</p> <p>a) Provide written guidance to define the type, scope, and format of entries</p> <p>b) Minimum information required:</p> <p>i) Changes in facility operating mode or condition</p> <p>ii) Record of critical data</p> <p>iii) Abnormal facility configurations</p> <p>iv) Status changes in safety-related or important equipment</p> <p>v) Occurrences of reportable events</p> <p>vi) Initiation and completion of surveillance tests</p> <p>vii) Actions that breach operational safety limits</p> <p>viii) Security incidents</p>	<p>3) Information to be Recorded</p> <p>a) Information to be recorded is identified in ??? OPM 2.7, "Logkeeping"</p> <p>b) Minimum information required in OPM 2.7 is:</p> <p>i) Changes in ERL accelerator operating mode or condition</p> <p>ii) Record of critical accelerator data and shift summaries</p> <p>iii) Abnormal accelerator or experimental area configurations</p> <p>iv) Status changes in safety-related or important equipment such as access control system changes</p> <p>v) Occurrences of reportable events</p> <p>vi) Initiation and completion of accelerator tests</p> <p>vii) Actions that breach operational safety limits</p> <p>viii) Security incidents</p>	<p>3) Information to be Recorded None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> ix) Out-of-specification chemistry or process results x) Shift reliefs 	<ul style="list-style-type: none"> ix) Out-of-specification process results such as high beam losses x) Shift and personnel changes 	
<ul style="list-style-type: none"> 4) Legibility <ul style="list-style-type: none"> a) Logs must be legible, understandable and suitable for photocopying 	<ul style="list-style-type: none"> 4) Legibility <ul style="list-style-type: none"> a) OPM 2.7, "Logkeeping," indicates that entries are to be legible and made with a pen in a color that can be photocopied. ??? Several operations logs are electronic or 'E-logs' and rules for E-logs are in OPM 2.7. 	<ul style="list-style-type: none"> 4) Legibility None
<ul style="list-style-type: none"> 5) Corrections <ul style="list-style-type: none"> a) Do not erase or cover up entries; score them out with a single line 	<ul style="list-style-type: none"> 5) Corrections <ul style="list-style-type: none"> a) OPM 2.7, "Logkeeping," ??? indicates that paper log entries are to be crossed out with a single line and are not to be completely obscured 	<ul style="list-style-type: none"> 5) Corrections None
<ul style="list-style-type: none"> 6) Log Review <ul style="list-style-type: none"> a) Logs must be reviewed periodically by supervisors 	<ul style="list-style-type: none"> 6) Log Review <ul style="list-style-type: none"> a) Logbooks, or photocopies, are made readily available and are reviewed each day during operations by supervisors and management. Formal review of logs is periodically performed by the C-AD Q-staff. See OPM 13.10.1, "Independent Assessment." Log entry summaries for each shift are E-mailed to supervisors and managers ???. 	<ul style="list-style-type: none"> 6) Log Review None
<ul style="list-style-type: none"> 7) Care and Keeping of Logs <ul style="list-style-type: none"> a) Provide written guidance on the disposition of completed logs: <ul style="list-style-type: none"> i) Make available for operators returning after an absence ii) Storing for expected life of the facility iii) Retrieving stored logs 	<ul style="list-style-type: none"> 7) Care and Keeping of Logs <ul style="list-style-type: none"> a) Written guidance on the disposition of logbooks is provided in OPM 2.7, "Logkeeping" and: <ul style="list-style-type: none"> i) Availability for operators and physicists returning after an absence is described ii) Storing for expected life of the ERL is described iii) Retrieving stored logs at C-AD is described 	<ul style="list-style-type: none"> 7) Care and Keeping of Logs None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Turnover Checklists</p> <p>a) Checklists should document that the following have been reviewed:</p> <p>i) Equipment checklists showing status, and noting any abnormal lineups or valid alarms</p> <p>ii) Round sheets and logs</p> <p>iii) Operator checklists providing vital information on key operational and safety parameters</p> <p>iv) Operations Supervisory Checklists showing facility status, planned maintenance, and tests</p>	<p>1) Turnover Checklists</p> <p>a) Checklists document many parameters that are reviewed after a specific evolution. Search the operations procedures for checklists, aids, lists, etc. These checklists generally relate to turnover of a system for routine operations as opposed to shift turnover:</p> <p>i) Equipment checklists showing status, and noting any abnormal lineups or valid alarms; for example, see OPM XXX, "ERL Cave Sweep Checklist"</p> <p>ii) Round sheets and logs; for example, see ??? OPM 4.1.f, "C-A Gate Security Log Sheet for Remote Access"</p> <p>iii) Operator checklists providing vital information on key operational and safety parameters; for example, see OPM 9.1.2, "Procedure for Preparing and Maintaining an RSC Check-Off List and Assuring that RSC Recommendations are Completed"</p> <p>iv) Operations supervisory checklists showing facility status, planned maintenance, and tests; for example, see ??? OPM 2.27.a, "Operations Acceptance of New and Modified Equipment/Systems Checklist"</p>	<p>1) Turnover Checklists None</p>
<p>2) Document Review</p> <p>a) A review of documents and checklists, as required, should be made to ensure that the operators review and understand the important operations history, the present status of the equipment, and any planned events.</p>	<p>2) Document Review</p> <p>a) Shift turnovers include a thorough review of appropriate documents describing important aspects of accelerator status, and some shift turnovers may include a review of a checklist if relevant to operations or ESH. Reviews are complimented by a discussion between the off-going and oncoming operators and physicists. For example ???, see OPM 2.8, "Shift Turnover," OPM 7.1.1, "Operations Shift Turnover," and OPM 12.16, "Shift Change."</p>	<p>2) Document Review None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>3) Control Panel Walkdown</p> <p>a) Walkdown the control panels to determine the plant's status by observing system lineups, switch positions, lighted annunciators, chart recorders, and status lights</p> <p>b) Oncoming and outgoing personnel should review control panels together.</p>	<p>3) Control Panel Walkdown</p> <p>a) Shift turnovers include a thorough inspection of equipment, control systems and appropriate accelerator instrumentation. ???See OPM 2.8, "Shift Turnover."</p> <p>b) Reviews are complemented by a discussion between the off-going and oncoming operators and physicists. See OPM XXX, "Shift Turnover." OPM 7.1.1.</p>	<p>3) Control Panel Walkdown</p> <p>None</p>
<p>4) Discussion and Exchange of Responsibility</p> <p>a) When all operations personnel are confident that the oncoming personnel are fully cognizant of plant conditions, and conditions are stable, the oncoming operators and supervisor should state that they take responsibility for the shift, and note such in the appropriate log</p>	<p>4) Discussion and Exchange of Responsibility</p> <p>a) The oncoming Operators-in-Charge and the physicists signify that they are cognizant of the ERL facility operations and are prepared to assume responsibility for operations at the end of the previous shift. ??? See OPM 2.8, "Shift Turnover."</p>	<p>4) Discussion and Exchange of Responsibility</p> <p>None</p>
<p>5) Shift Crew Briefing</p> <p>a) Briefing of operators and support groups, as required, should be conducted by the Operations Supervisor and include a review of the facility status, equipment problems, and changes in progress or planned changes</p>	<p>5) Shift Crew Briefing</p> <p>a) Any special information required on a particular shift is written in the logbook by the senior person in charge of the group and verbally emphasized during briefings with operators. ??? See OPM 2.8, "Shift Turnover."</p>	<p>5) Shift Crew Briefing</p> <p>None</p>
<p>6) Reliefs Occurring During the Shift</p> <p>a) Relief reviews and walkdowns should be performed as required, depending on the familiarity of the oncoming persons with the current conditions</p>	<p>6) Reliefs Occurring During the Shift</p> <p>a) Exchange of the eOperator in Charge, operators or physicists during a shift is done in a way to ensure that the oncoming person is knowledgeable of the conditions as they would have been had a complete shift turnover process been conducted. See ??? OPM 2.8, "Shift Turnover."</p>	<p>6) Reliefs Occurring During the Shift</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Operator Responsibilities</p> <p>a) Operators should be able to recognize out-of-specification process parameters, adverse trends, and be familiar with corrective actions</p>	<p>1) Operator Responsibilities</p> <p>a) Operators and physicists are trained to respond to out-of-specification process parameters and adverse trends. See OPM 10.1, "Occurrence Reporting," and OPM XXX, "Response to Chipmunk Interlocks." A call-in-list of system experts is maintained and, if necessary, operators/physicists will shut down the system or the entire program in order to maintain a safe status.</p>	<p>1) Operator Responsibilities None</p>
<p>2) Operator Knowledge</p> <p>a) Operators should be knowledgeable of processes and safety that affect operation and should be able to analyze off-normal situations and take action to correct the causes. Examples of process information include:</p> <p>i) Water pH, and conductivity</p> <p>ii) Hazards associated with chemical storage</p> <p>iii) Properties and hazards of such gases as hydrogen, nitrogen, carbon dioxide, chlorine, and halon</p> <p>iv) Water-treatment equipment use</p> <p>v) Knowledge of operating limits, characteristics of off-normal and unique processes, and associated response and recovery conditions</p>	<p>2) Operator Knowledge</p> <p>a) Operators and physicists are knowledgeable of processes and safety that affect operation and are able to analyze off-normal situations and take action to correct the causes. Examples of process information include:</p> <p>i) Cooling system parameters such as pressure and temperature are monitored and alarmed as needed to warn operators of abnormal conditions. The Water Systems Group is responsible for controlling the water chemistry aspects of all water systems.</p> <p>ii) Hazards associated with chemical storage. See OPM 1.8, "Hazard Communication." All chemicals have associated an MSDS. These may be viewed at the BNL MSDS website.</p> <p>iii) Properties and hazards of gases. See for example OPM 8.12.2, "Securing Explosive Gas Devices From Operation"</p> <p>iv) Knowledge of cooling towers, evaporative coolers and water treatment systems. See Process Evaluations, EMS Process Specific Training and EMS Operational Control Forms. The Water Systems Group has the responsibility to monitor the water treatment systems.</p> <p>v) Knowledge of operating limits, characteristics of off-normal and unique processes, and associated response and recovery conditions. See the ASE parameter requirements in the ASEs and in OPM 2.5.4. See also OPM 10.2, "Response to Water Spills," and Operational Control Forms.</p>	<p>2) Operator Knowledge None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
3) Operator Response to Process Problems a) Operators should be capable of making the appropriate responses to process conditions	3) Operator Response to Process Problems a) Operators and physicists are trained to make appropriate responses to process conditions. See, for example, ??? OPM 6.1.3 , "Response to Chipmunk Alarms" and Operational Control Forms .	3) Operator Response to Process Problems None
4) Communication Between Operators & Process Personnel a) Operators should receive reports from, and communicate with, process personnel about important process matters	4) Communication Between Operators & Process Personnel a) Operators/physicists of unique processes report to the Operator-in Charge in the ERL Control Room. See ??? OPM 2.1 , "Operations Organization and Administration." Shift logs and ??? Trouble Reports are used to communicate important process matters. See Accelerator Operations .	4) Communication Between Operators & Process Personnel None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) File Index</p> <p>a) A list of the types of documents to be included in the required reading file should be maintained including:</p> <p>i) Changes in the process</p> <p>ii) Changes in equipment design</p> <p>iii) Information on industry and facility operating experiences</p> <p>iv) Information necessary to keep operations personnel informed of current facility activities</p> <p>b) Material should be screened to ensure that only the appropriate material is kept in file.</p>	<p>1) File Index</p> <p>a) The type of document to be included in the required reading file is indicated in ??? OPM 1.2, "C-A Documents," and includes:</p> <p>i) Changes in the operation</p> <p>ii) Changes in equipment that impact on operations</p> <p>iii) Information on operating experiences</p> <p>iv) Information necessary to keep operations personnel and physicists informed of current facility activities</p> <p>b) Information is screened by the ERL Group Leader to ensure that only the appropriate material is kept in file.</p>	<p>1) File Index None</p>
<p>2) Reading Assignments</p> <p>a) A method should be in place to designate which documents need to be read and where they can be found and filed.</p>	<p>2) Reading Assignments</p> <p>a) Operators-in Charge, Operators and Physicists are required to read all documents in the Required Reading Binder, Temporary Procedures Log and Hand Processed Change Log. Operators are reminded via a Daily Orders ??? system. See C-AD ??? OPM 2.8, "Shift Turnover."</p>	<p>2) Reading Assignments None</p>
<p>3) Required Dates for Completion of Reading</p> <p>a) A required completion date, based on the material, should be determined for all material.</p> <p>b) Documents required to be read before shift assignments should be clearly designated.</p>	<p>3) Required Dates for Completion of Reading</p> <p>a) All reading is to be completed within 10 days of issue, see C-AD ??? OPM 2.8 "Shift Turnover."</p> <p>b) Documents required to be read before shift assignments are clearly designated for immediate attention through the ??? Daily Orders system.</p>	<p>3) Required Dates for Completion of Reading None</p>
<p>4) Documentation</p> <p>a) Reading should be documented and a file maintained with information.</p>	<p>4) Documentation</p> <p>a) All reading material is appropriately signed off. The ERL Operations Supervisor maintains the Required Reading Binder and sign-offs. See C-AD ??? OPM 2.8, "Shift Turnover."</p>	<p>4) Documentation None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
5) Review a) Periodic reviews of the required reading program should be performed b) Material which has been read by all should be either discarded or filed, as appropriate	5) Review a) The The ERL Operations Supervisor periodically reviews the Required Reading Binder b) The Required Reading Binder is purged every fiscal year and material is either discarded or filed as appropriate. See OPM 1.2 , "C-A Documents."	5) Review None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Content and Format</p> <p>a) Operations orders should contain special operations requirements, administrative directions, special data collection requirements, trending requirements, and other short-term matters</p> <p>b) Orders should be clearly written, dated, and maintained</p> <p>c) Operations orders program should not be used to change operating procedures</p> <p>d) Information intended to be permanent should be incorporated in administrative procedures</p>	<p>1) Content and Format</p> <p>a) Operations orders are normally provided via the "Daily Orders" ??? and "Long-Term Orders" ??? logbooks??? pages on the C-AD Web-site. These orders contain special operations requirements, administrative directions, special data collection requirements, trending requirements, and other short-term matters.</p> <p>b) Orders are clearly written, dated, and maintained by the ERL Operations Supervisor</p> <p>c) Orders are not used to change operating procedures</p> <p>d) Information intended to be permanent is incorporated. See C-AD OPM 1.4.3, "Procedure For Implementing New, Revised or Canceling Permanent Procedures."</p>	<p>1) Content and Format</p> <p>None</p>
<p>2) Issuing, Segregating and Reviewing Orders</p> <p>a) Orders should be issued by the operations supervisor to operating personnel</p> <p>b) Orders should be segregated into long-term and daily orders to facilitate review</p> <p>c) Daily orders that are extended should be reviewed daily</p> <p>d) Long-term orders should be reviewed periodically</p> <p>e) Review of orders should be documented in log books</p>	<p>2) Issuing, Segregating and Reviewing Orders</p> <p>a) Orders are issued by the ERL Operations Supervisor to operating personnel and physicists</p> <p>b) Long Term Orders are generally applicable for a typical R&D phase running period</p> <p>c) Daily orders are reviewed and deleted every 30 days</p> <p>d) Long Term Orders are reviewed periodically</p> <p>e) Review of orders is documented by the ERL Operations Supervisor in the Order Review Log.</p>	<p>2) Issuing, Segregating and Reviewing Orders</p> <p>None</p>
<p>3) Removal of Orders</p> <p>a) Outdated orders should be removed or canceled</p> <p>b) Operations supervisors should review orders to assure they are current</p>	<p>3) Removal of Orders</p> <p>a) Orders are removed when appropriate by the ERL Operations Supervisor. See XXX OPM 1.2, "C-AD Documents."</p> <p>b) The ERL Operations Supervisor periodically reviews orders to ensure they are current</p>	<p>3) Removal of Orders</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>1) Procedure Development</p> <p>a) Procedures should be developed to assist in the development and review of operations procedures and should include methods and formats for them</p> <p>b) Procedures should be developed giving administrative and technical direction for all anticipated operations, system changes, alarm responses, and abnormal or emergency situations also giving the appropriate responses</p> <p>c) The detail in the procedure should be consistent with the complexity of the task, the experience and training of the person performing the task, the frequency of performance, and the consequences of errors</p>	<p>1) Procedure Development</p> <p>a) Procedures exist to assist in the development and review of C-AD operations procedures. These procedures include methods and formats. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures," C-AD OPM 1.4.1, "Format of C-AD Policies, Programs and Operating Procedures," and C-AD OPM 1.4.4, "Procedure For Implementing or Canceling Temporary Procedures."</p> <p>b) Procedures exist at C-AD to give administrative and technical direction for all anticipated operations, system changes, alarm responses, and abnormal or emergency situations, and also to give the appropriate responses. In order to ensure this, procedure development is governed by a series of management, administrative and technical review processes. See C-AD OPM 1.4.3, "Procedure for Implementing New or Revised Permanent Procedures, or Canceling Permanent Procedures."</p> <p>c) The detail in procedures and training is consistent with the complexity of the task, the experience and training of the person performing the task, the frequency of performance, and the consequences of errors.</p>	<p>1) Procedure Development None</p>
<p>2) Procedure Content</p> <p>a) The following requirements should be followed to assure that the content conforms to the prescribed guidelines:</p> <p>i) Scope and applicability should be apparent. Emergency procedures should be easily distinguishable from other procedures by use of a color code</p> <p>ii) Procedures should incorporate information from appropriate reference sources</p> <p>iii) Prerequisites and initial conditions, including verification of the condition of</p>	<p>2) Procedure Content</p> <p>a) The following requirements are followed to assure that the procedure content conforms to the prescribed guidelines:</p> <p>i) Scope and applicability are apparent. Emergency procedures are easily distinguishable from other procedures by use of a Chapter Number. See C-AD OPM Chapter 3, "C-AD Emergency Procedures."</p> <p>ii) Procedures incorporate information from the most appropriate reference source, which is the Standards Based Management System</p> <p>iii) Prerequisites and initial conditions, including verification of the condition of the equipment to be used, is detailed and set out in a place within the procedure which is easily found. See C-AD OPM 1.4.1,</p>	<p>2) Procedure Content None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>the equipment to be used, should be detailed and set out in a place within the procedure which is easily found.</p> <p>iv) Definitions should be explained.</p> <p>v) Procedures should be easily understood and actions clearly stated</p> <p>vi) Procedures should contain only one action per step</p> <p>vii) Procedures should contain sufficient but not excessive detail based on the skill level of those executing the procedure</p> <p>viii) Warnings, notes, and cautions should be easily recognizable</p> <p>ix) Warnings and cautions should precede the step to which they apply and appear on the same page</p> <p>x) Procedures should be technically and administratively accurate and include sufficient information and correct references</p> <p>xi) Sign-offs should be provided for each critical step</p> <p>xii) Limits and tolerances for operating parameters should be consistent with</p>	<p>“Format of C-AD Policies, Programs and Operating Procedures.”</p> <p>iv) Definitions are explained; see OPM 1.3, “Definitions”. In addition, each OPM has its own definitions as needed.</p> <p>v) Procedures are easily understood and actions clearly stated. See C-AD OPM 1.4.1, “Format of C-AD Policies, Programs and Operating Procedures.”</p> <p>vi) Procedure writers are requested to contain only one action per step. See C-AD OPM 1.4.1, “Format of C-AD Policies, Programs and Operating Procedures.”</p> <p>vii) Procedures contain sufficient but not excessive detail and are based on the skill level of those executing the procedure.</p> <p>viii) Warnings, notes, and cautions are easily recognizable. See C-AD OPM 1.4.1, “Format of C-AD Policies, Programs and Operating Procedures.”</p> <p>ix) Warnings and cautions precede the step to which they apply and appear on the same page. See C-AD OPM 1.4.1, “Format of C-AD Policies, Programs and Operating Procedures.”</p> <p>x) A review process helps ensure procedures are technically and administratively accurate and include sufficient information and correct references; see C-AD OPM 1.4.3.a, “C-A Permanent Procedure Tracking Form for New or Revised Procedures”</p> <p>xi) Sign-off is provided for critical steps where appropriate; for example, search for checklists, approvals, etc. at Search.</p> <p>xii) Limits and tolerances for operating parameters are consistent with readable accuracy of instruments; for example, see limits in the ERL Accelerator Safety EnvelopeXX and the associated OPM 2.5 series procedure that are well within the readable accuracy of instruments</p>	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>readable accuracy of instruments</p> <p>xiii) Criteria for surveillance or test procedures should be easily understood. If calculations are required, they should be explained</p> <p>xiv) Sequence of procedural steps should conform to normal or expected operational sequences</p> <p>xv) Procedures should incorporate human factors, such as exact references to components and documents, and include highlights of operational limits, warnings, and cautions</p> <p>xvi) Emergency operating procedures should consider single and multiple causalities</p> <p>xvii) References to procedural steps unrelated to the procedure being used should be avoided</p> <p>xviii) Component or system shutdown and restoration requirements following shutdown, maintenance, or surveillance should be specified</p>	<p>xiii) Criteria for surveillance or test procedures are easily understood. Calculations, when required, are explained. See for example OPM xxx, "Responding to Chipmunk Interlocks."</p> <p>xiv) Sequence of procedural steps conforms to normal or expected operational sequences. See C-AD OPM 1.4.1, "Format of C-AD Policies, Programs and Operating Procedures."</p> <p>xv) Procedures incorporate human factors, such as exact references to components and documents, and include highlights of operational limits, warnings, and cautions; see C-AD OPM 1.4.1, "Format of C-AD Policies, Programs and Operating Procedures."</p> <p>xvi) Emergency operating procedures apply to different types of events; see C-AD OPM Chapter 3, C-AD Emergency Procedures</p> <p>xvii) References to procedural steps unrelated to the procedure being used are avoided or identified by "GOTO" or "REFER TO" in capitals; see C-AD OPM 1.4.1, "Format of C-AD Policies, Programs and Operating Procedures."</p> <p>xviii) Component or system shutdown and restoration requirements following shutdown, maintenance, or surveillance are specified. See for example XXXXXXXXXX, OPM 11.4.3, "STAR Power Supply SHUT-DOWN Check Off List or OPM 8.33.b, "J10 Power Supply Shut-Down Check Off List " or OPM 5.29, "AGS, BOOSTER Ring, and Beam Transport Shutdown."</p>	
<p>3) Procedure Changes and Revisions</p> <p>a) The review and approval process for each procedure and change should be documented. Procedure changes imply temporary changes, to a procedure without retyping it. Procedure revisions constitute the retyping and reissuance of the procedure. Changes and revisions should conform to the following:</p>	<p>3) Procedure Changes and Revisions</p> <p>a) Procedure changes at C-AD are performed under C-AD OPM 1.4.5, "Procedure for Implementing Hand processed Changes," and procedure revisions are performed under C-AD OPM 1.4.3, "Procedure for Implementing New, Revised Permanent Procedures or Canceling Permanent Procedures. These procedures conform to the following:</p>	<p>3) Procedure Changes and Revisions</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> i) Procedure changes should be documented in a logbook readily available for operator reference ii) Procedure changes and revisions should be made when errors or omissions are noted iii) Procedure revisions should be started when a temporary change has been outstanding for a long period of time iv) Procedure revisions should be implemented concurrently with modifications v) Information on changes or revisions should be communicated to operations personnel through shift briefings or through required reading vi) The reasons behind important procedure steps should be documented to assure their importance is maintained vii) Procedure reviews should involve a walk-through or a similar process 	<ul style="list-style-type: none"> i) Procedure changes are documented in a logbook readily available for operator reference ii) Procedure changes and revisions are made when errors or omissions are noted iii) Procedure revisions are started simultaneously when a hand-processed change is made iv) Procedure revisions are implemented concurrently with modifications v) Information on changes or revisions is communicated to operations personnel through shift briefings, classroom training or through required reading xix) The reasons behind important procedure steps are generally documented in safety or design reviews. When Caution and Warning statements are used in procedures, the consequence of not following the Caution or Warning is stated. See C-AD OPM 1.4.1, "Format of C-AD Policies, Programs and Operating Procedures." vi) Procedure reviews for sweep procedures such as the XXXX C-AD OPM 4.56 Series, "Procedures for Sweeping Primary Beam Enclosures – Controlled Access," involve a walk-through 	

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>4) Procedure Approval</p> <p>a) Operating procedures should be approved by the Operations Supervisor</p> <p>b) Procedures which affect safety-related equipment and emergency procedures should be reviewed by the safety review committee of the department or facility</p> <p>c) Revisions to the procedures should receive the same level of approval as the initial versions. New and revised procedures should be approved before use</p> <p>d) Temporary changes should be approved by a least two individuals, one of whom must be the Operations Supervisor</p>	<p>4) Procedure Approval</p> <p>a) Operating procedures are approved by the C-AD operations management and supervisors where appropriate. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures," and C-AD OPM 1.1, "Authorization."</p> <p>b) Procedures which affect safety-related equipment and emergency procedures are reviewed by the appropriate C-AD safety review committee. See C-AD OPM 9.2.1, "Procedure for Reviewing Environmental, Health and Safety Aspects of Experiments," C-AD OPM 9.3.1, "Procedure for Reviewing Conventional Safety Aspects of a C-A System," and C-AD OPM 1.1, "Authorization."</p> <p>c) Revisions to the procedures receive the same level of approval as the initial versions. New and revised procedures are approved before use. See C-AD OPM 1.4.3, "Procedure For Implementing New or Revised Permanent Procedures or Canceling Permanent Procedures."</p> <p>d) Temporary procedures and Hand Processed Changes are approved by a least two individuals, one of whom must be the C-AD Head of MCR or TVDG Operations Supervisor, as appropriate, or an equivalent authority. See C-AD OPM 1.4.5, "Procedure for Implementing Hand processed Changes."</p>	<p>4) Procedure Approval None</p>
<p>5) Procedure Review</p> <p>a) Procedures should be reviewed before they are issued and at periodic intervals to assure that information is accurate and that human factors have been considered</p> <p>b) Applicable procedures should be reviewed after an unusual occurrence, or other significant event</p> <p>c) New procedures should be walked through to ensure their workability</p>	<p>5) Procedure Review</p> <p>a) Procedures are reviewed before they are issued and at three-year intervals in order to assure that information is accurate and that human factors have been considered. The ERL Operations Supervisor issues temporary procedures. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures."</p> <p>b) Applicable procedures are reviewed after an unusual occurrence, or other significant event. See C-AD OPM 10.1, "Occurrence Reporting and Processing of Significant Operations Information."</p> <p>c) New procedures are walked through to ensure their workability. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures."</p>	<p>5) Procedure Review None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
<p>6) Procedure Availability</p> <p>a) Controlled copies of procedures should be maintained in control areas for operator reference, and in other areas as appropriate</p> <p>b) Working copies should be controlled and a system put in place to ensure outdated procedures are replaced</p>	<p>6) Procedure Availability</p> <p>a) Controlled copies of the C-AD procedures are maintained for operator/physicist reference and in other areas as appropriate. See C-AD OPM 1.2, "C-A Documents." Current procedures are maintained on an intranet for ease of access; the QA and Documentation Manager maintains the original copy of all procedures. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures."</p> <p>b) Official copies of procedures are maintained at an official, fire-walled website. Before using a printed copy, workers must verify that the procedure is the most current version by checking the document issue date on this website.</p>	<p>6) Procedure Availability</p> <p>None</p>
<p>7) Procedure Use</p> <p>a) The requirements for using the procedures should be understood by all operators</p> <p>b) Operators need not look up the emergency procedures when taking immediate actions in emergency situations, but the procedures should be reviewed immediately after to validate the action</p>	<p>7) Procedure Use</p> <p>a) The requirements for using the procedures are understood by all operators. This is accomplished through appropriate training programs, testing and procedure walkdowns. See C-AD OPM 1.12, "Training and Qualification Plan."</p> <p>b) Operators generally do need not look up the emergency procedures when taking immediate actions in emergency situations; however, they are reviewed immediately after to validate the actions taken. See C-AD OPM 3.1, "Emergency Procedures to be Implemented by the Department Emergency Coordinator," section 5, for example.</p>	<p>7) Procedure Use</p> <p>None</p>

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Operator Aid Development a) Anyone can develop an aid, but facility personnel must be informed of the importance of controlling such information	1) Operator Aid Development a) Operations aids are maintained on the ERL Operation's Web-site. Rules for controlling such information are in OPM 1.2 , "C-A Documents," section 5.	1) Operator Aid Development None
2) Approval a) The Operations Supervisor must approve all operator aids. Aids which alter procedures should be incorporated into procedures.	2) Approval a) The ERL Operations Supervisor approves of all operator aids. See xxx OPM 1.2 , "C-A Documents." Aids are not used to alter procedures.	2) Approval None
3) Posting a) Posted materials should be located near their area of use and not obscure any instruments or controls. Aids should be protected and properly secured	3) Posting a) XXX Aids may be viewed via computer "windows" at control consoles in the ERL Control Room. They do not obscure any instruments or controls. Aids are protected and properly secured by the ERL Operations Supervisor.	3) Posting None
4) Use of Aids a) Aids should supplement approved procedures and not be used in lieu of them	4) Use of Aids a) Operator aids do not contain material that is procedural in nature. They contain maps, equipment lists and non-emergency call-down lists, for example. In some cases, an approved procedure may be posted in the field.	4) Use of Aids None
5) Documentation a) A listing of all approved operator aids should be maintained and audited	5) Documentation a) XXX An operator-aid index is on the ERL Operation's Web-site. Aids are maintained and audited by the ERL Operations Supervisor.	5) Documentation None
6) Review a) The approved aid list should be reviewed periodically to assure outdated aids are removed and missing aids are replaced. As procedures are updated, related aids should be updated.	6) Review a) XXX Operator aids are reviewed periodically by the ERL Operations Supervisor. See OPM 1.2 , "C-A Documents" for review requirements.	6) Review None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Components Requiring Labeling a) Valves b) Major Equipment c) Switches d) Circuit Breakers e) Fuse Blocks f) Instruments and Gages g) Electrical Busses and Switchgear h) Cabinets (Relay, Terminal) i) Room Doors j) Emergency Equipment (Fire Alarm Stations, Intercom Equipment) k) Fire Protection Equipment	1) Components Requiring Labeling a) Rules for labeling items a) through k) in column 1 are found in SBMS. See for example Identification of and Piping Systems and Electrical Safety . The labeling requirements in OSHA 29CFR1910 are also followed.	1) Components Requiring Labeling None
2) Label Information a) Information on labels should be consistent with information found in procedures, and system diagrams b) Labels should be permanent, securely attached, and easy to read c) If color coding is used, it should be consistent d) Piping should indicate the fluid contained and the normal direction of flow. OSHA color coding should be used, and piping containing hazardous fluids or gasses should be uniquely identified e) Labels should be suitable for their environment	2) Label Information a) Information on labels is consistent with information found in procedures and system diagrams b) Labels are permanent or securely attached, and easy to read c) Color coding, when used, is consistent d) Piping indicates the fluid contained and the normal direction of flow. OSHA color coding is used, and piping containing hazardous fluids or gasses is uniquely identified. e) Labels are suitable for their environment	2) Label Information None
3) Label Placement a) Labels should be placed on or as near as possible to equipment to be labeled	3) Label Placement a) Labels are placed on or as near as possible to equipment to be labeled	3) Label Placement None

GUIDELINE	PERFORMANCE	EXCEPTIONS
<ul style="list-style-type: none"> b) Labels should be oriented for easy reading <p>4) Replacing Labels</p> <ul style="list-style-type: none"> a) Identifying Lost or Damaged Labels <ul style="list-style-type: none"> i) Procedures should be established to replace labels that are lost or damaged ii) Post maintenance tests should include a review of labels iii) Where informal labeling is used, it should be replaced with proper labels b) Providing New Labels <ul style="list-style-type: none"> i) There should be methods and facilities to create required labels ii) Replacement of labels or attachment of temporary labels should be verified 	<ul style="list-style-type: none"> b) Labels are oriented for easy reading <p>4) Replacing Labels</p> <ul style="list-style-type: none"> a) Identifying Lost or Damaged Labels <ul style="list-style-type: none"> i) Procedures are established to replace labels that are lost or damaged ii) Post maintenance tests include a review of labels iii) Where informal labels are found, they are replaced with proper labels b) Providing New Labels <ul style="list-style-type: none"> i) There are methods and facilities to create required labels ii) Replacement of labels or attachment of temporary labels is verified 	<p>4) Replacing Labels None</p>