Department of Energy
Brookhaven Site Office
P.O. Box 5000
Upton, New York 11973

MAR 27 2008

Mr. Michael Bebon
Brookhaven Science Associates, LLC
Brookhaven National Laboratory
Upton, New York 11973

Dear Mr. Bebon:

SUBJECT: APPROVAL OF COLLIDER-ACCELERATOR DEPARTMENT (C-AD) CONDUCT OF OPERATIONS CONFORMANCE MATRIX

Reference: Letter from P. Bond, BSA, to M. Holland, SC-BHSO, Subject: Collider-Accelerator Department Conduct of Operations Conformance Matrix, dated June 14, 2006

The Brookhaven Site Office (BHSO) has reviewed the C-AD Conduct of Operations Conformance Matrix as transmitted in the above referenced letter. Based on BHSO review, the Conduct of Operations Conformance Matrix is approved. Enclosed is the C-AD Conduct of Operations Conformance Matrix with its cover page signed (DOE Approval).

If you have any questions, please contact Peter Kelley of my staff at extension 5784.

Sincerely,

M. Holland

Michael D. Holland
Site Manager

Enclosure:
As Stated

cc: D. Lowenstein, BSA, w/encl.
E. Lessard, BSA, w/encl.
R. Karol, BSA, w/encl.

BROOKHAVEN
NATIONAL LABORATORY

September 13, 1991
Revised January 28, 1992
Revised January 31, 1997
Revised October 1, 1999
Revised January 2, 2003
Revised June 13, 2006

COLLIDER-ACCELERATOR DEPARTMENT (C-AD)

CONDUCT OF OPERATIONS CONFORMANCE MATRIX

Prepared By: Ray Karol
R. Karol, C-AD ESSHQ Division Head

Departmental Approval: Edward T Lessard
E. T. Lessard, C-AD Associate Chair for ESSHQ

D. Lowenstein, C-AD Department Chair

BNL Review: Peter Bond
P. Bond, Associate Laboratory Director for HENP

DOE Approval: M. Holland

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Policies a) Specify goals and the means to achieve them	1) Policies a) Goals, objectives and targets, some of which are derived from institutional-level documents, e.g., an Appendix of the BSA Contract, Critical Outcomes, Objectives and Performance Measures, are integrated into the Department's Environmental Management Programs (EMPs), OSH Management Plan and the annual Self Assessment Plan for the C-AD. The C-AD goal for risk from all hazards is not only to be below relevant legal limits, but also is to be 'as low as reasonably achievable (ALARA).' The goal for work related illness and injury is zero and ESH is an overarching priority for all activities. For radiation exposure, the annual ALARA goal is recommended by the ALARA Committee and approved by the Department Chair. The ALARA philosophy has also been expanded to include waste generation and the potential for pollution from accelerators and experiments. Performance against goals is reviewed by C-AD and BNL managers at the annual Environmental, OSH and Self Assessment Management Review, and resources are assigned, if appropriate, following the review.	1) Policies None
b) Specify the type of controls necessary to implement the policy	b) Supervision, administrative controls, training, procedures and engineered safety systems are used to implement policy.	
c) Personnel should understand their authority and responsibility, through accountability	c) Authority, responsibility, accountability and interfaces with other groups are defined clearly in the Operation Procedure Manual (OPM), Chapter 1, "Authorization, C-AD Documents, and Definitions" and Chapter 2, "Guidelines for the Conduct of C-AD Operations." Specific individuals are trained and held accountable for safety, emergency, commissioning and operations roles. The Department employs the R2A2 concept, which is an institutional program to define role, responsibility, accountability and authority for each employee. In addition, to hold all staff responsible for accountability, OPM 1.26, "C-AD Standards for Disciplinary Action" describes the Department disciplinary policy.	
d) Physical Security should conform to DOE 5630.11, "Safeguards and Security Program"	d) The exterior doors to most buildings are locked from 5 PM to 8:30 AM and on weekends and holidays. The accelerator vault at the Tandem Van De Graaff (TVDG) is secured when operations personnel are not in residence. A C-A Property Protection Area (PPA) is a facility, or portion thereof, that requires access control to prevent unacceptable loss or destruction of	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	valuable property and/or disruption of research. Assigned PPA's for C-A are Cryogenic Control Room (Building 1005S), the Equipment Area (Building 911B), and NSRL Experimental Building 958, when the facilities are operating. See OPM 2.32, "Access Controls – Building 911B, 958 and 1005 Property Protection Areas (During Operations)." C-AD accelerator areas are secured via automatic access-control system hardware. In addition, requirements for security of valuable materials is specified in OPM 1.20, "C-A Policy for Valuable Materials Security" and OPM 9.10, "C-AD Security Committee Policy and Requirements."	
2) Resources a) Provide sufficient resources, material, and labor b) Do not use excessive overtime c) Provide technical support personnel d) Develop a long range staffing plan.	2) Resources a) We have a minimum numbers of Operators and Operations Coordinators defined in the Accelerator Safety Envelopes. This minimum staff is deemed sufficient by DOE for safe operation, although larger staffs are used routinely for operational efficiency. During operations, materials and resources for the accelerators are managed day-to-day by the Operations Coordinator, and during Shutdown, by the Maintenance Coordinator. Sufficient resources are provided. b) Excessive overtime is avoided where possible by using shift operations. Overtime is specifically addressed in OPM 1.23, "Staff Working Hours and On-Call Hours." c) The technical support personnel, accelerator operators, Siemen's operators, Radiological Control Technicians (RCTs), Collider Accelerator Support (CAS) personnel and Cryogenic Systems (Cryo) Watch personnel, are staffed according to various changes in operations. d) C-AD management prepares a long-range staffing plan	2) Resources None
3) Monitoring Of Operations Performance a) Refer to Chapter VI for operating problems b) Document problems for evaluation	3) Monitoring Of Operations Performance a) See Chapter VI for operating problems 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 Trouble Reporting System (OPM 2.9) and occurrences are documented via the Occurrence Reporting System (OPM	3) Monitoring Of Operations Performance None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	10.1). Minor issues are critiqued to reduce the chances that they lead to future occurrences. The C-AD operators use a web-based machine-performance monitoring log.	
c) Supervisor should observe operations frequently.	c) Supervisors participate in inspections and audits, they are members of safety review committees, and they are encouraged by C-AD management to 'supervise by walking around.'	
d) Operations Goals should be to:	d) Operations Goals	
i) Minimize the unavailability of the safety system	i) Operations procedures minimize the unavailability of safety systems by requiring operations to be curtailed should safety systems fail to operate	
ii) Minimize personnel errors	ii) Minimizing personnel errors is a goal, see OPM 2.1, "Operations Organization and Administration." INPO Human Performance approaches are used to minimize events by recognizing error-likely situations	
iii) Conform to ALARA guidelines	iii) ALARA is integrated into routine operations via OPM 6.1.0, "ALARA Strategies for Tuning during Proton Operations" and into work review and planning via ALARA Committee procedures (OPM Chapter 9.5 series). Operators aim at reducing beam losses to the lowest reasonably achievable level.	
iv) Minimize loss of the facility capability	iv) High reliability is a C-AD goal given the overarching constraints of safety and the available resources. Equipment breakdown at C-AD is the major source of radiation exposure to workers, and high reliability is built into components based on experience gained in the past 45 years. At the TVDG, a computer aided maintenance program is audited on a daily basis in order to aim for maximum system and facility availability.	
v) Minimize the number of unscheduled shutdowns	v) Unscheduled shutdowns are minimized through periodic maintenance, formal reporting of problems such as the C-AD Trouble Report System, good communications between users and operators such as the Weekly Time Meeting and the C-AD Web Site, and by designing	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	equipment to be "radiation hardened."	
vi) Complete inspections on a timely basis	vi) Completing inspections on a timely basis is ensured through written procedures and checklists for Operators, RCTs, Cryo Watch and CAS	
vii) Minimize the amount of overtime	vii) Maintaining shift operations during running periods minimizes overtime. Overtime is specifically addressed in OPM 1.23, "Staff Working Hours and On-Call Hours."	
viii) Achieve and maintain complete staffing and training requirements	viii) Achieving and maintaining complete staffing and training requirements are requirements in OPM 2.1, "Operations Organization and Administration." For example, see the Operational Safety Limit for Operators, Operations Coordinators and Watch for Hydrogen Targets in OPM 2.5, "Accelerator Safety Envelope Parameters for AGS, Booster, Linac and Associated Experimental Areas."	
ix) Minimize waste	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.	
x) Minimize the number of lighted annunciators	x) When new systems are introduced into the Main Control Room, Sieman's Control Room, TVDG Control Room and Cryogenic Control Room, human factors are considered in the design of panels and annunciators.	
xi) Goals should be measurable, achievable, and auditable	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." Each week during	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	operations and less frequently during major shutdowns, physicists, operators, Head of Main Control Room, Users, and C-AD management meet to critique the previous week's operations and to discuss future goals.	
xii) Develop an Action Plan to meet goals	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.	
xiii) Report results of audits to facility management and DOE	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.	
xiv) Perform Self-Assessments	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 Baldridge Award Criteria in the Assessment Planning and Evaluation Criteria Framework as defined in the SBMS Integrated Assessment Subject Area.	
4) Accountability a) Hold workers and supervisors accountable for their actions	4) Accountability 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.	4) Accountability None
b) Use discipline and performance appraisals to ensure accountability	b) Adhering to all rules, including rules dealing with safety, quality, operations or maintenance, is factored into an individual's appraisal, performance goals	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	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.	
5) Management Training a) Formal training of supervisors and other management should be incorporated into overall training plan.	5) Management Training 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).	5) Management Training None

GUIDELINE	PERFORMANCE	EXCEPTIONS
6) Planning For Safety a) Provide guidance to personnel so that they understand safety requirements b) Explain the role of Safety Analysis system to all operations personnel	6) Planning For Safety 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. b) The Accelerator Safety Envelopes (OPM 2.5 series of OPMs) binds operators. 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.	6) Planning for Safety None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Status Reports a) Notify Supervisor of changes in facility status, and all abnormalities and unexpected situations	1) Status Reports a) Operators and 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 reported under the C-AD Trouble Report System, see OPM 2.9. The Operator's Log documents day-to-day changes in facility status and is reviewed each day by C-AD management. Abnormalities and unexpected situations at TVDG are reported according to the notification list in OPM 12.5, "Emergency Notification List," and at the rest of C-AD in OPM 10.1.a, "Occurrence Notification Call List."	1) Status Reports None
2) Safety Practices a) Adhere to BNL safety program, including the use of protective equipment	2) Safety Practices a) OPM 2.2, "Operating Practices" requires operations crews to adhere to procedures and to sound operating practices. All operators 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.	2) Safety Practices None
3) Inspection Tours a) Perform inspection tours to ensure the status of equipment is known b) Use tours to become familiar with the facility condition c) Tour activities should include: i) Reviewing equipment status	3) Inspection Tours a) The on-duty Operations Coordinator visits, each shift, experimenters and the experimental areas b) Tour activities at C-AD are covered in OPM 2.2 "Operating Practices." Shift personnel perform a tour of the accelerators and experimental areas and perform surveillance activities according to their procedures. OPM 12.7, "Facility Startup Inspection" describes specific facility tours at TVDG. Tours or sweeps are also used to ensure personnel are out of primary and secondary areas before beam is enabled. c) Tour activities include the following: i) A periodic review of equipment status including an examination of radiation levels, particle fluence rates, system pressures, temperatures and access control mode.	3) Inspection Tours None

GUIDELINE	PERFORMANCE	EXCEPTIONS
ii) Looking for unexpected conditions	ii) Operators are trained to look for unexpected conditions such as radiation levels, water leaks or smoke and to check local status panels and local alarms when on tour. The operators are also trained to inspect for area-specific abnormal conditions; for example, see OPM 4.7, "Secondary Beam Line Sweep, Access and Clearance Procedures."	
iii) Checking panel & annunciator operation	iii) Local annunciators alert the person on tour to abnormal conditions. For inaccessible areas, panel annunciators are used to alert the operator in the Main Control Room (MCR). Primary areas are inaccessible during operations periods. Inaccessible areas use various sensors for smoke, water, pressure, ground faults and radiation which annunciate in the Main Control Room and/or at the CAS watch station when appropriate.	
iv) Notation of any deficiencies found	iv) Deficiencies are noted in Trouble Reports or the logs of the various touring groups or, if necessary, reported back up the supervisory chain for immediate action	
4) Round Tours a) Use approved Round Tour Inspection Sheets	4) Round Tours a) The RCTs, Cryogenic Watch, Experiment Shift Leaders (ESLs) and 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.	4) Round Tours None
b) Record key parameters to analyze performance of systems and equipment and to facilitate shift turnover	b) Key parameters for equipment and systems are monitored and recorded in the Main Control Room, Cryogenic Control Room, TVDG Control Room and at remote locations. Set points are monitored in the Main Control Room every 24 hours. Shift records are maintained and reviewed during an overlap period in the shift change.	
c) Round sheets should have the maximum and minimum values and operational safety limits highlighted to facilitate comparison with noted values.	c) The maximum and minimum values are in the controls database for parameters monitored from the Main Control Room. Operational safety limits are listed in procedures. Maximum radiation levels are denoted by standard radiological area classifications. Cryogenic and hydrogen target systems have parameter ranges written on their round sheets.	
d) Review recorded values for trends	d) Radiation surveys and area monitoring data are routinely reviewed to estimate potential exposure of workers and experimenters. Equipment	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	operations are continually monitored from the Main 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 respond to this alert by returning power supplies back to service or by realigning the beam 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. The Head of the Cryogenics Group periodically reviews the cryogenic system performance and hydrogen target checklists for trends in pressure or temperature.	
5) Personnel Protection a) Conform to 10CFR835 (ALARA) b) Assure proper use of Work Permits c) Supervisors should review exposure trends of workers	5) Personnel Protection a) Operators 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, 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. 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	5) Personnel Protection None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	recommendations to the C-AD Department Chair on dose goals for the coming year.	
6) Response to Indications a) Identify and correct faulty instruments b) Believe instrument readings unless proven unreliable	6) Response to Indications a) Prompt action is taken to investigate abnormal or unexpected indication, see, for example, OPM 6.1.2, "Responding to Chipmunk Interlocks," or OPM 6.1.3, "Responding to Chipmunk Alarms". b) Operators 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.	6) Response to Indications None
7) Resetting Protective Devices a) Understand current conditions prior to resetting protective devices	7) Resetting Protective Devices a) When a protective device trips the accelerator 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 to understand the trip before the device is reset. The formality of this undertaking is written into procedures. See, for example, OPM 6.1.2, OPM 6.1.3 for radiation alarm response and OPM 3.15 and OPM 12.11 for oxygen deficiency alarm response.	7) Resetting Protective Devices None
8) Load Changes a) Supervisor must approve any changes	8) Load Changes a) The Operations Coordinator 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 MCR Group Leader provides guidance to the MCR 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."	8) Load Changes None
9) Authority to Operate a) Operators should understand their authority to	9) Authority to Operate a) Trained and qualified personnel operate C-AD equipment. A web-based	9) Authority to Operate None

GUIDELINE	PERFORMANCE	EXCEPTIONS
operate and that of the Supervisor	database lists all training records and identifies qualified personnel according to job classification (e.g., MCR Operators, Operations Coordinators, Power Room Operators, CAS, Cryogenic Watch, RCTs and TVDG operators). R2A2s are signed by personnel so that they are able to personally acknowledge their roles, responsibilities, authorities and accountabilities.	
10) Shift Operating Bases a) Establish places for administration, communications, and shift turnover	10) Shift Operating Bases a) The C-AD Main Control Room serves as the operating base. It is equipped with office equipment needed to conduct duties, including communications equipment. It has a separate conference room and other areas for conducting shift changeover activities. Other operating bases include the RCT Offices, the Siemen's Control Room, the g-2 Cryogenic Control Room, the RHIC Cryogenic Control Room, the CAS Target Desk and the TVDG Control Room. These areas are also equipped with appropriate communications.	10) Shift Operating Bases None
11) Potentially Distractive Material a) Should be prohibited or controlled	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."	11) Potentially Distractive Material None

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 Main Control Room is limited to those persons on official business only. See OPM 2.3, "Activities in Control Rooms." The Main Control Room has clear boundaries of glass walls, regular walls and glass doors. Similar controls are used at other C-AD Control Rooms such as the Siemen's Control Room, the TVDG Control Room and the Cryogenics Control Room. b) Only trained Operators and Operations Coordinators 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 Main Control Room is under the purview of the Operations Coordinator. See OPM 2.3, "Activities in Control Rooms". All accelerator and experimental 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 Operations Coordinator is the arbitrator. See OPM 2.3, "Activities in Control Room." The adjacent Main Control Room conference room is segregated from the Main Control Room by thick glass walls, and is not directly in view of Main Control Room personnel.	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 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	3) Monitoring the Main Control Panels None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	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.	
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 Main Control Room or other C-AD Control Rooms. 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
1) Emergency Communications Systems a) Provide means to notify personnel of an emergency b) Periodically test emergency communications systems c) Control Area should be able to override the communications systems	1) Emergency Communications Systems a) Emergency signals such as fire or evacuation alarms are audible throughout the C-AD buildings 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." 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. 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."	1) Emergency Communications Systems None
2) Public Address Systems a) Should be administratively controlled b) Includes the use of the paging systems	2) Public Address Systems 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" 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.	2) Public Address Systems None
3) Contacting Operators a) Distinguish between emergency and normal communications	3) Contacting Operators a) Operators use hand held radios for communications in order to be in constant contact with the Main Control Room. 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.	3) Contacting Operators None

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Radios a) Post areas where use of radios will cause interference with equipment b) Consider the use of dedicated radio channels for specific operations groups	4) Radios 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. 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."	4) Radios None
5) Abbreviations & Acronyms a) Use approved list for written and verbal communications	5) Abbreviations & Acronyms 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"	5) Abbreviations & Acronyms None
6) Oral Instructions & Information Communication a) Should be clear and concise b) Use repeat back techniques to assure accurate communication	6) Oral Instructions & Information Communication a) Operators are instructed to speak clearly and concisely. See OPM 3.5, "Emergency Procedures to be Implemented by Main Control Room Operators or Collider-Accelerator Support Technicians" b) Operators are trained to repeat information, see OPM 2.12, "Communications Practices"	6) Oral Instructions & Information Communication None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Adhere to Training Program a) Program should list requirements for training, and items to be accomplished	1) Adhere to Training Program 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.	1) Adhere to Training Program None
2) On-Shift Instructor Qualification a) The qualifications of instructors must be defined	2) On-Shift Instructor Qualification a) 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."	2) On-Shift Instructor Qualification None
3) Qualified Operator Supervision & Control of Trainees a) Careful observation of trainees is required b) Instructor should discuss procedure steps in detail c) Instructor should be able to intervene, if required d) Instructors should verify any recorded readings and discuss the implications of trends and off-normal readings	3) Qualified Operator Supervision & Control of Trainees a) Trainees are observed by senior operators. See OPM 2.4, "Operator Trainees" b) Procedure training is via classroom, question and answer forms or by walk-through of the procedure steps with the instructor c) Instructors for operators are supervisors or lead personnel and supervisors are trained to intervene or stop work when needed d) Verifying recorded readings and discussing implications of trends and off-normal readings is part of the training	3) Qualified Operator Supervision & Control of Trainees None

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. Operator 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 equipment by operator-trainees is suspended when necessary to ensure safe and reliable operation of the C-AD, 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
1) Events Requiring Investigation a) Establish criteria for when to perform an investigation b) List specific events requiring investigation c) Establish criteria for a "near miss" situation d) The following events require investigation: i) Violation of design limits ii) Unusual, abnormal, or unexplained performance or safety conditions iii) Improper positioning of safety system features iv) Unexplained shutdown v) Violation of a procedure or human error which could have serious implications vi) Failure of equipment with safety implications vii) Exceeding radiological or toxic substance limits viii) Actual or attempted sabotage	1) Events Requiring Investigation 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. 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. 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. d) OPM 10.1 , OPM 9.4.5 and the Occurrence Categorizer's Procedure establishes the following as events requiring investigation: i) Violation of design limits ii) Unusual, abnormal or unexplained performance or safety conditions iii) Improper positioning of safety system features iv) Unexplained shutdown v) Violation of a procedure or human error which could have serious implications vi) Failure of equipment with safety implications vii) Exceeding radiological or toxic substance limits	1) Events Requiring Investigation None

GUIDELINE	PERFORMANCE	EXCEPTIONS
ix) Review committee deems an investigation is necessary x) Loss of Special Nuclear Material xi) Occurrence of repetitive problem	viii) Actual or attempted sabotage ix) Whenever a review committee deems an investigation is necessary x) Loss of Special Nuclear Material xi) Occurrence of repetitive problem	
2) Investigation Responsibility a) Manager has ultimate responsibility for consistency and thoroughness of event investigation	2) Investigation Responsibility 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"	2) Investigation Responsibility None
3) Investigator Qualification a) Investigators should be knowledgeable with no vested interest or bias b) Investigators should be trained	3) Investigator Qualification 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	3) Investigator Qualification None
4) Information to be Gathered a) Collect the following information as soon as possible: i) Initial condition of facility ii) Statements of operators and other personnel iii) Logs and computer printouts	4) Information to be Gathered a) The initial actions by the Operations Coordinator or Supervisor 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: 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 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.	4) Information to be Gathered None

GUIDELINE	PERFORMANCE	EXCEPTIONS
iv) Other pertinent documents	iv) Pertinent documents that are preserved in 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		
6) Investigative Report a) Report should include: 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) b) The report should have the appropriate reviews and approvals	6) Investigative Report a) The C-AD uses the DOE ORPS reporting system and the requirements for Critiques 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 Critiques. The ORPs form includes the topics listed in this Conduct of Operations guideline. b) ORPs reports and critiques require appropriate reviews and sign-offs as indicated in the relevant subject areas	6) Investigative Report None
7) Event Training a) Provide a mechanism to train personnel on aspects of the event in a timely fashion	7) Event Training 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.	7) Event Training None
8) Event Trending a) Track patterns of deficiencies, such as operator errors and inadequate procedures.	8) Event Trending 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.	8) Event Trending None

GUIDELINE	PERFORMANCE	EXCEPTIONS
b) Keep a summary of all events for review.	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).	
9) Sabotage a) There should be an immediate investigation to: i) Ensure operability of safety systems ii) Decide if facility should be shutdown b) Minimize any impact of discovered sabotage and determine future actions	9) Sabotage 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) Operators 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.	9) Sabotage None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Notification Procedures a) Notification procedures should include: i) Designation of specific responsibilities for notifications ii) Identification of events and conditions requiring notifications iii) Identification of primary and alternate personnel to notify in various situations iv) Establishment of time requirements for notifications v) Definition of record-keeping requirements	1) Notification Procedures a) Notification procedures are as follows: 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." ii) Events and conditions requiring notifications at the C-AD are specified in procedures. For example OPM 10.1 and OPM 7.1.1, "Operations Shift Turnover." 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." iv) The establishment of time requirements for notifications is specified in OPM 10.1 v) Record-keeping requirements are defined in OPM 10.1 for occurrences and OPM 13.4.1, "Records Management" for all C-AD records	1) Notification Procedures None
2) Notification Responsibility a) Operations supervisor has ultimate responsibility for notifications	2) Notification Responsibility a) The on-duty Operations Coordinator or the appropriate C-AD supervisor has the responsibility for notifications, see OPM 10.1	2) Notification Responsibility None
3) Names & Phone Numbers a) Include primary and alternate names with phone numbers and pager numbers in a readily accessible place	3) Names & Phone Numbers a) The call list is maintained for the C-AD Department in OPM 10.1.a, "Occurrence Notification Call List"	3) Names & Phone Numbers None
4) Documentation a) Maintain record of notifications	4) Documentation a) The C-AD notifications for occurrences are maintained in ORPS records. Also, C-AD maintains records of notifications in operations logs.	4) Documentation None
5) Communication Equipment a) Provide adequate equipment to address communication requirements	5) Communication Equipment 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	5) Communication Equipment None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Status Change Authorization and Reporting 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	1) Status Change Authorization and Reporting a) Authorization is defined in OPM 1.1 "Authorization." The Operations Coordinator is responsible for proper configuration and any changes. b) The Operations Coordinator 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 Coordinator is kept informed. Operators are required to document changes to accelerator devices in the Operations Log Book, and Operation Group Log Sheets, see OPM 1.2, "C-AD Documents," and in computer generated reports. TVDG changes are documented per OPM 12.10, "Operations Reporting and LogBooks." d) Operators and Operations Coordinators are located together in the Main Control Room to ensure information flow. A communication protocol between the C-AD MCR, RHIC Cryogenic Control Room, Sieman's Operator, CAS and the TVDG Control Room has been established. e) Individuals who authorize status changes report these changes to the Main Control Room. For example, see OPM 2.12.1, "Communication Of The Cryogenic System Status To The Operations Coordinator."	1) Status Change Authorization and Reporting None

GUIDELINE	PERFORMANCE	EXCEPTIONS
2) Equipment & Systems Alignment a) Check systems for proper alignment before placing them in operation b) Use alignment checklists to aid operators c) Include the proper nomenclature in the checklists, and have lists signed off at each step d) Check equipment in accordance with technical specifications and operational limits for start-up situations and after maintenance e) Maintain checklists for review and analysis	2) Equipment & Systems Alignment a) Initial system alignment checklists are given in OPM Chapter 5 , "AGS 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. TVDG equipment configuration is recorded in logbooks per procedures in OPM Chapter 12, "Tandem Van De Graaff." b) Checklist for specific equipment and tasks are documented in OPMs. Search the operations procedures for checklists, aids, lists, etc. c) Operators 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 8, "Detailed System Procedures," and in OPM Chapter 4, "Access Security Procedures." Sign-off steps are included. 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, OPM 2.5.1, OPM 2.5.2 and OPM 2.5.3. Operational Safety Limits are reviewed prior to an annual running period. e) Records of initial system alignments are maintained for review and analysis by the supervisor	Equipment & Systems Alignment None
3) Equipment Locking and Tagging a) All personnel should have training on responsibilities for locking and tagging and on manipulation of locks and tags	3) Equipment Locking and Tagging a) Equipment locking and tagging are covered for example in OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy," OPM 2.6, "Lockout/Tagout Procedure for Personnel Entry into the AGS or Booster Ring," OPM 2.6.1, "Procedure for Lockout/Tagout for the AGS and Booster Rings During Accelerator Operations," OPM 2.6.10, "Lockout/Tagout Procedure for RHIC Main Power Supplies," and OPM 9.1.16 "Lockout/Tagout For Radiation Safety." All appropriate C-AD personnel have been trained in these procedures. These procedures are consistent with SBMS requirements. All appropriate persons have been	3) Equipment Locking and Tagging None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	trained in these standards.	
4) Operational Limits Compliance 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	4) Operational Limits Compliance 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 Coordinators, Liaison Physicists, Access Controls Groups and other relevant personnel are trained in ASE procedures. d) Compliance with specific limits is reviewed; e.g., the ASE for energy flux is tracked each running period. Periodic management assessments (OPM 13.10.1, "Independent Assessment") are also used to review compliance with the ASE.	5) Operational Limits Compliance None
5) Equipment Deficiency Identification & Documentation a) Methods to identify, document, communicate, and control deficiencies should be established.	5) Equipment Deficiency Identification & Documentation a) Equipment deficiencies are identified and communicated via the Trouble Reporting program (OPM 2.9). 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. TVDG equipment problems, which do not impact the complex, are documented as defined in OPM 12.10, "Operations Reporting and Log Books."	5) Equipment Deficiency Identification & Documentation None
6) Work Authorization and Documentation 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	6) Work Authorization and Documentation a) Permit systems for activities affecting fire alarm, fire protection, radiation safety, radiation alarms, access control, digging, enhanced work control, welding and cutting and electrical safety are in use at C-AD. The Maintenance Coordinator 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	6) Work Authorization and Documentation None

GUIDELINE	PERFORMANCE	EXCEPTIONS
7) Equipment Post-Maintenance Testing & Return to Service a) Equipment should be tested after maintenance to demonstrate its proper operation b) Testing should be documented	7) Equipment Post-Maintenance Testing & Return to Service 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. Each running period, the alarm panel lights are tested for all consoles in MCR. Deficiencies are repaired prior to operations. b) Testing is documented in accordance with applicable procedures and work controls	7) Equipment Post-Maintenance Testing & Return to Service None
8) Alarm Status a) Status and control and alarm panels should be available and include information on: b) Alarms which have been disabled c) Inputs which have been disabled d) Alarms with set-point changes e) Actions of alarms with multiple inputs f) Appropriate actions should be taken to unmask simultaneous alarms from multiple sources	8) Alarm Status a) The MCR is arranged such that there are five separate control consoles plus one additional console devoted to 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 Siemen's Control Room, TVDG Control Room, Cryogenic Control Room and the CAS Building. b) Critical alarms cannot be disabled, or set points changed, by operations personnel c) Radiation monitor alarm inputs may not be disabled by operators, and if disconnected an alarm sounds d) Safety related audible alarms cannot be adjusted to different set points or different sound levels e) Actions by operators in response to multiple radiation monitor alarms are documented in OPM 6.1.2, "Responding to Chipmunk Interlocks", and OPM 6.1.3, "Responding to Chipmunk Alarms" f) Simultaneous alarms are unmasked by the system and multiple radiation-monitor alarms are conspicuous	8) Alarm Status None

GUIDELINE	PERFORMANCE	EXCEPTIONS
9) Temporary Modification Control a) Provide administrative controls for temporary changes in configuration and procedures	9) Temporary Modification Control a) Administrative controls for temporary modifications are the norm. The accelerators are constantly under development as are the experiments. 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.	9) Temporary Modification Control None
b) Controls should provide the following: i) Technical oversight	b) Formal controls and procedures provide the following: 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.	
ii) Formal approvals	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).	
iii) Safety reviews	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.	
iv) Installation approval	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 Head of the Main Control Room 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."	
v) Independent verification of installation or removal	v) Independent verification of installation or removal of the access control system or shielding is performed by the Radiation Safety Committee.	

GUIDELINE	PERFORMANCE	EXCEPTIONS
	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.	
vi) Documentation of modification	vi) Documentation associated with modifications is retained in accord with OPM procedures	
vii) Updating of operating procedures	vii) Updating of temporary operating procedures is controlled in OPM 1.4.4 "Procedure for Implementing or Canceling Temporary Procedures"	
viii) Training in modifications	viii) Training requirements are defined in the temporary procedure itself	
ix) Periodic audits of outstanding modifications	ix) Temporary procedures are reviewed each running period by the Head of the MCR, and are removed or converted to permanent procedures. The Radiation Safety Committee periodically reviews temporary modifications to safety significant equipment, such as interlock bypasses.	
10) Distribution & Control of Equipment & Systems Documents a) Provide system for distribution of controlled documents	10) Distribution & Control of Equipment & Systems Documents 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	10) Distribution & Control of Equipment & Systems Documents None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Lockout/Tagout Use a) Definitions b) Lockout is the placement of a lock to render a device inoperable c) Tagout 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 d) Use of keys should be controlled	1) Lockout/Tagout Use a) ESH 1.5.0 Electrical Safety and ES&H 1.5.1 Lockout/Tagout Requirements 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. b) Lockout at C-AD is the placement of a lock to render a device inoperable c) Tagout at C-AD is the application of a warning device on a control d) Lockout keys are controlled; OPMs 2.6, 2.6.1, 2.6.2, 2.6.3, 2.6.4, 2.6.5, 2.6.6, 2.6.8 and 9.1.16 are examples of C-AD procedures that provide lockout and tagout instructions for specific systems	1) Lockout/Tagout Use None
2) Lockout and Tagout Implementation a) If an isolating device can be locked out, then it should be locked out b) If an isolating device can not be locked out, it should be tagged out c) If major modifications to equipment are made, the addition of lock out capability should be considered d) The following are example administrative controls: i) Generate a list of devices that must be locked out ii) Establish criteria for locking out	2) Lockout and Tagout Implementation a) The C-AD uses locks wherever locks can possibly be applied, or where locks can be retrofitted for the purpose of isolating devices b) Tagouts are used at C-AD if a device cannot be locked out 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. d) The C-AD uses the following administrative controls: i) Lists of devices that must be locked out. See, for example, OPM 2.6.1.a, "AGS Ring Lockout-Tagout Checklist – CONTROLLED ACCESS." ii) Written criteria for lockout. See, for example, OPM 9.1.16 "Lockout / Tagout for Radiation Safety."	2) Lockout and Tagout Implementation None

GUIDELINE	PERFORMANCE	EXCEPTIONS
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	iii) Controls for the distribution and access of keys. See OPM 4.1.c, "Keys Required to Access Primary Beam Enclosures," OPM 2.6.1, "Lockout Tagout Procedure for AGS and Booster Rings During Accelerator Operations," paragraph 5.2.6 and OPM 7.1.39, "Cryogenic Group Lockout/Tagout," paragraph 5.4.8 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 ES&H 1.5.1 Lockout/Tagout Requirements v) Documentation is associated with specific lockout and tagout procedures. See, for example, OPM 2.6.1, "Lockout Tagout Procedure for the AGS and Booster Rings, During Accelerator Operations." 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).	
3) Protective Materials and Hardware a) Includes locks, tags, and chains b) Lockout and Tagout devices should be singularly identified, and meet the following: 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	3) Protective Materials and Hardware a) LOTO materials include standardized locks and tags. See ES&H 1.5.1 Lockout/Tagout Requirements 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: 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	3) Protective Materials and Hardware None

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Lockout/Tagout Program a) Establish procedures for the program	4) Lockout/Tagout Program a) ESH 1.5.0 Electrical Safety and ES&H 1.5.1 Lockout/Tagout Requirements 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	4) Lockout/Tagout Program None
5) Procedures for Lockout/Tagout a) Procedures should include, but are not limited to following: i) Statement of intended use ii) Specific steps for placing, removing and transferring of tags and locks iii) Testing requirements to verify the isolation of the energy source b) Specific procedures are not required when all the following requirements are: i) Machine has no stored energy after shutdown ii) Machine has a single, easily identifiable energy source iii) Isolation of the source will completely de-energize the machine iv) Machine is isolated from the energy source and locked out v) A single lockout device only is required vi) Lockout is under the exclusive control of authorized personnel	5) Procedures for Lockout/Tagout a) C-AD LOTO-specific procedures, for example OPM 2.6, "Lockout/Tagout Procedure for Personnel Entry into the AGS or Booster Ring," or OPM 2.6.1, "Procedure for Lockout/Tagout of AGS and Booster Rings During Accelerator Operations," include: i) Statement of intended use ii) Specific steps for placing, removing and transferring of tags and locks iii) Testing requirements to verify the isolation of the energy source b) Personnel applying LOTO not covered by a specific C-AD procedure follow the BNL procedure in ES&H 1.5.1 Lockout/Tagout Requirements 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.	5) Procedures for Lockout/Tagout None

GUIDELINE	PERFORMANCE	EXCEPTIONS
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	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).	
6) Application of Lockout/Tagout a) The program should cover the following procedures: i) Preparation for Shutdown (1) Inform affected personnel of hazards and of controls to be used ii) Machine or Equipment Shutdown (1) Use established procedures iii) Equipment Isolation (1) Apply the lockout or tagout device iv) Affixing Locks/Tags (1) Securely affix tags with qualified personnel v) Stored Energy (1) Render safe any stored energy and	6) Application of Lockout/Tagout a) The C-AD has formal programs and procedures to: i) Prepare for Shutdown (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 (1) See for example shutdown procedure OPM 5.29, "AGS, Booster Ring and Beam Transport Shutdown," and OPM 12.17, "Shut Down Before Power Outage" iii) Equipment Isolation (1) C-AD has specific LOTO procedures to isolate specific devices. See OPM 2.6, "Lockout/Tagout Procedure for Personnel Entry Into the AGS or Booster Ring." iv) Affix Locks/Tags (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 (1) Stored energy is rendered safe. For example, large vacuum	6) Application of Lockout/Tagout None

GUIDELINE	PERFORMANCE	EXCEPTIONS
prevent any re-accumulation	windows are covered prior to work on or near the window	
vi) Verification of Isolation (1) Before starting work, verify isolation of the device	vi) Verification of Isolation (1) Personnel are trained to verify isolation of devices before work begins. See ES&H 1.5.1 Lockout/Tagout Requirements and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy".	
vii) Release from Lockout/Tagout (1) Before restoring equipment, perform the following: (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 (b) Personnel (i) Check that affected personnel are safe and are informed of energization (c) Lockout/Tagout Device Removal (i) The person who applied the isolation device shall be the one to remove it (ii) Document removal of tag via logbook or other methods	vii) Release from Lockout/Tagout (1) Before restoring equipment, personnel are trained in the ES&H 1.5.1 Lockout/Tagout Requirements and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" to ensure: (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 (b) Personnel (i) That affected personnel are safe and are informed of energization. (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	

GUIDELINE	PERFORMANCE	EXCEPTIONS
(d) Procedures for removal by a person other than who placed the device: (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	(d) Procedures such as OPM 2.14, "Removal of Locks and Tags by Others" ensure: (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	
7) Testing or Positioning of Equipment or Components a) When a temporary removal is required: 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	7) Testing or Positioning of Equipment or Components a) For temporary removal of LOTO, the specific procedure steps would include the following where appropriate: 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	7) Testing or Positioning of Equipment or Components None

GUIDELINE	PERFORMANCE	EXCEPTIONS
8) Periodic Inspections a) Perform audit for compliance with program	8) Periodic Inspections 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).	8) Periodic Inspections None
9) Caution Tags a) Do not use for personnel protection b) Tags should show: i) Tag identification system ii) Information on any precautions iii) Signature of person applying the tag c) Keep records of use d) Apply so that the tag does not interfere with operation of equipment	9) Caution Tags 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. b) Tags show: i) Tag identification system ii) Information on any precautions iii) Signature of person applying the tag c) OPM 2.13 is the record of use d) Personnel are trained to ensure the tag does not interfere with operation of equipment	9) Caution Tags None

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

GUIDELINE	PERFORMANCE	EXCEPTIONS
13) Outside Contractors a) Plant and contractor personnel should inform each other of their requirements	13) Outside Contractors 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."	13) Outside Contractors None
14) Group Lockouts a) Procedures must be developed for crews equivalent to procedures for personnel Lockout/Tagout	14) Group Lockouts a) ES&H 1.5.1 Lockout/Tagout Requirements and OPM 2.36, "Lock and Tag Program for Control of Hazardous Energy" establish generic group lockout requirements. C-AD procedure OPM 2.6, "Lockout/Tagout Procedure for Personnel Entry into Booster or AGS Ring" establishes the group lockout requirements for the C-AD rings and OPM 7.1.39, "Cryogenic Group Lockout/Tagout" for Collider cryogenic systems.	14) Group Lockouts None
15) Shift or Personnel Changes a) Procedures should be developed to assure the continuity of Lockout/Tagout protection between personnel or shifts	15) Shift or Personnel Changes a) ES&H 1.5.1 Lockout/Tagout Requirements 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.	15) Shift or Personnel Changes None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Components Requiring Independent Verification a) Components that ensure safe and reliable operation, as determined by safety analysis, should receive independent analysis in accordance with the following requirements: b) Credited Safety Systems i) Not required if: (1) Mispositioning would not affect the system performance (2) Mispositioning would be immediately known to operator	1) Components Requiring Independent Verification a) Credited safety structures, systems and components at the accelerator complex receive independent analysis in accordance with the following requirements 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 hydrogen and flammable gas monitoring systems are reviewed by the Accelerator Systems Safety Review Committee and the Experimental Safety Review Committee. i) Independent verification is required at C-AD: (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 (2) Mispositioning of safety significant systems would not necessarily be apparent to operators; although indicators for the access control system are displayed in MCR. 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 4.120.6, "Access Control – Annual Acceptance Tests for 6 O'clock." 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 Radiological Controls Division assigned to C-	1) Components Requiring Independent Verification None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	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.	
(3) Independent verification would involve significant radiation exposure	(3) Independent verification does not involve significant radiation exposure at C-AD. The accelerators 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.	
c) Non-Safety Related Systems	c) Non-safety related systems where independent verification is appropriate include beam loss monitoring systems, water cooling systems, activated soil caps and cryogenic systems	
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.	i) Liaison physicists review the response of beam loss monitoring systems during running periods. Liaison engineers annually check the integrity of the activated soil caps. The Water Systems Group monitors cooling systems for leaks. Water detection mats and secondary containments are used, and 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 Chapter 7, “Cryogenic Operations.”	

GUIDELINE	PERFORMANCE	EXCEPTIONS
2) Occasions Requiring Independent Verification a) Returning equipment to service after maintenance b) Removing equipment from service c) Periodic checks during normal operation	2) Occasions Requiring Independent Verification a) Equipment startup procedures cover check out or start up of systems. See OPM Chapter 5, "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 5.29, "AGS, Booster Ring and 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 CAS Watch personnel and by the Radiological Control Technicians	2) Occasions Requiring Independent Verification None
3) Verification Techniques - General Guidelines a) Independence i) Should be conducted in a manner to identify the component, its required position and actual position b) Remote Position Indicators i) Perform check local to the device, unless precluded by ALARA c) Process Parameters 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	3) Verification Techniques - General Guidelines a) Independence i) Specific examples of independent verification techniques may be found throughout the OPM. For example, see attachments to procedure OPM 2.6.1, "Procedure for Lockout/Tagout of AGS and Booster Rings, During Accelerator Operations" that require two operators to identify the component and its position b) Remote Position Indicators 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 a beam line or accelerator c) Process Parameters i) Process parameters, such as radiation monitor set points for alarm in MCR 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." d) Throttled Valves	3) Verification Techniques - General Guidelines None

GUIDELINE	PERFORMANCE	EXCEPTIONS
i) Position indicators should be used in conjunction with observing the actions of valve actuator to proper verification	i) Position indicators are used in conjunction with observing the actions of valve actuators; for example, see OPM 7.1.11, “25 kW Helium Refrigerator Cooldown”	
e) Surveillance Testing i) Independent verification should be used only when proven to satisfy independent verification requirements	e) Surveillance Testing C-AD programs satisfy BNL institutional requirements in SBMS Integrated Assessment	
f) Operation Self-Appraisal and Verification i) Should be performed periodically to ensure that the ES&H considerations, and operations functions are being conducted in accordance with established criteria	f) Operation Self-Appraisal and Verification i) Operation self-appraisal and verification are performed periodically; see OPM 13.10.1, "Independent Assessment."	

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Establishment of Operating Logs a) Logs should be established for all key control points including operations supervisor, and control room operator b) Provide narrative sections on round sheets when logs are not used at a particular control point	1) Establishment of Operating Logs a) Logs are maintained for all key shift positions, See OPM 1.2, "C-AD Documents." Also see the Accelerator Division Operations Web. b) Narrative sections are provided on round sheets where appropriate. For example, see OPM 4.56.a "AGS Ring Sweep Checklist." Also see the Accelerator Division Operations Web	1) Establishment of Operating Logs None
2) Timeliness of Recordings a) Log information should be recorded as soon as possible to prevent inaccuracies.	2) Timeliness of Recordings 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.	2) Timeliness of Recordings None
3) Information to be Recorded a) Provide written guidance to define the type, scope, and format of entries b) Minimum information required: i) Changes in facility operating mode or condition ii) Record of critical data iii) Abnormal facility configurations iv) Status changes in safety-related or important equipment v) Occurrences of reportable events vi) Initiation and completion of surveillance tests vii) Actions that breech operational safety limits viii) Security incidents	3) Information to be Recorded a) Information to be recorded is identified in OPM 2.7, "Logkeeping" b) Minimum information required in OPM 2.7 is: i) Changes in accelerator operating mode or condition ii) Record of critical accelerator data and shift summaries iii) Abnormal accelerator or experimental area configurations iv) Status changes in safety-related or important equipment such as access control system changes v) Occurrences of reportable events vi) Initiation and completion of accelerator tests vii) Actions that breech operational safety limits viii) Security incidents	3) Information to be Recorded None

GUIDELINE	PERFORMANCE	EXCEPTIONS
ix) Out-of-specification chemistry or process results x) Shift reliefs	ix) Out-of-specification process results such as high beam losses x) Shift and personnel changes	
4) Legibility a) Logs must be legible, understandable and suitable for photocopying	4) Legibility 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.	4) Legibility None
5) Corrections a) Do not erase or cover up entries; score them out with a single line	5) Corrections 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	5) Corrections None
6) Log Review a) Logs must be reviewed periodically by supervisors	6) Log Review 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.	6) Log Review None
7) Care and Keeping of Logs a) Provide written guidance on the disposition of completed logs: i) Make available for operators returning after an absence ii) Storing for expected life of the facility iii) Retrieving stored logs	7) Care and Keeping of Logs a) Written guidance on the disposition of logbooks is provided in OPM 2.7, "Logkeeping" and: i) Availability for operators returning after an absence is described ii) Storing for expected life of the C-AD is described iii) Retrieving stored logs at C-AD is described	7) Care and Keeping of Logs None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Turnover Checklists a) Checklists should document that the following have been reviewed: i) Equipment checklists showing status, and noting any abnormal lineups or valid alarms ii) Round sheets and logs iii) Operator checklists providing vital information on key operational and safety parameters iv) Operations Supervisory Checklists showing facility status, planned maintenance, and tests	1) Turnover Checklists 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: i) Equipment checklists showing status, and noting any abnormal lineups or valid alarms; for example, see OPM 4.56.a, "AGS Ring Sweep Checklist" ii) Round sheets and logs; for example, see OPM 4.1.f, "C-A Gate Security Log Sheet for Remote Access" 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" 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"	1) Turnover Checklists None
2) Document Review 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.	2) Document Review 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. For example, see OPM 2.8, "Shift Turnover," OPM 7.1.1, "Operations Shift Turnover," and OPM 12.16, "Shift Change."	2) Document Review None

GUIDELINE	PERFORMANCE	EXCEPTIONS
3) Control Panel Walkdown a) Walkdown the control panels to determine the plant's status by observing system lineups, switch positions, lighted annunciators, chart recorders, and status lights b) Oncoming and outgoing personnel should review control panels together.	3) Control Panel Walkdown a) Shift turnovers include a thorough inspection of equipment, control systems and appropriate accelerator instrumentation. See OPM 2.8, "Shift Turnover," OPM 7.1.1, “Operations Shift Turnover,” and OPM 12.16, “Shift Change.” b) Reviews are complemented by a discussion between the off-going and oncoming operators. See OPM 2.8, "Shift Turnover," OPM 7.1.1, “Operations Shift Turnover,” and OPM 12.16, “Shift Change.”	3) Control Panel Walkdown None
4) Discussion and Exchange of Responsibility 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	4) Discussion and Exchange of Responsibility a) The oncoming Operations Coordinator signifies that he/she is cognizant of facility operations and is prepared to assume responsibility for operations at the end of the previous shift. See OPM 2.8, "Shift Turnover," OPM 7.1.1, “Operations Shift Turnover,” and OPM 12.16, “Shift Change.”	4) Discussion and Exchange of Responsibility None
5) Shift Crew Briefing 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	5) Shift Crew Briefing 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," OPM 7.1.1, “Operations Shift Turnover,” and OPM 12.16, “Shift Change.”	5) Shift Crew Briefing None
6) Reliefs Occurring During the Shift a) Relief reviews and walkdowns should be performed as required, depending on the familiarity of the oncoming persons with the current conditions	6) Reliefs Occurring During the Shift a) Exchange of operators or the Operation Coordinator during a shift is done in a way to ensure that the oncoming person is knowledgeable of the conditions as he would have been had a complete shift turnover process been conducted. See OPM 2.8, "Shift Turnover," OPM 7.1.1, “Operations Shift Turnover,” and OPM 12.16, “Shift Change.”	6) Reliefs Occurring During the Shift None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Operator Responsibilities a) Operators should be able to recognize out-of-specification process parameters, adverse trends, and be familiar with corrective actions	1) Operator Responsibilities a) Operators are trained to respond to out-of-specification process parameters and adverse trends. See OPM 10.1, "Occurrence Reporting," and OPM 6.1.2, "Response to Chipmunk Interlocks." A call-in-list of system experts is maintained and, if necessary, operators will shut down the system or the entire program in order to maintain a safe status.	1) Operator Responsibilities None
2) Operator Knowledge 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: i) Water pH, and conductivity ii) Hazards associated with chemical storage iii) Properties and hazards of such gases as hydrogen, nitrogen, carbon dioxide, chlorine, and halon iv) Water-treatment equipment use v) Knowledge of operating limits, characteristics of off-normal and unique processes, and associated response and recovery conditions	2) Operator Knowledge a) Operators 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: 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. 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. iii) Properties and hazards of gases. See for example OPM 8.12.2, "Securing Explosive Gas Devices From Operation" 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. 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, OPM 2.5.1, OPM 2.5.2 and OPM 2.5.3. See also OPM 10.2, "Response to Water Spills," and Operational Control Forms.	2) Operator Knowledge None

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

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 Head of MCR 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
1) Content and Format a) Operations orders should contain special operations requirements, administrative directions, special data collection requirements, trending requirements, and other short-term matters b) Orders should be clearly written, dated, and maintained c) Operations orders program should not be used to change operating procedures d) Information intended to be permanent should be incorporated in administrative procedures	1) Content and Format a) Operations orders are normally provided via the "Daily Orders" and "Long-Term Orders" 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. b) Orders are clearly written, dated, and maintained by the Head of the MCR c) Orders are not used to change operating procedures d) Information intended to be permanent is incorporated. See C-AD OPM 1.4.3, "Procedure For Implementing New, Revised or Canceling Permanent Procedures."	1) Content and Format None
2) Issuing, Segregating and Reviewing Orders a) Orders should be issued by the operations supervisor to operating personnel b) Orders should be segregated into long-term and daily orders to facilitate review c) Daily orders that are extended should be reviewed daily d) Long-term orders should be reviewed periodically e) Review of orders should be documented in log books	2) Issuing, Segregating and Reviewing Orders a) Orders are issued by the C-AD Head of the MCR to operating personnel b) Long Term Orders are generally applicable for an 8 to 20 week period; that is, a typical running period c) Daily orders are reviewed and deleted every 30 days d) Long Term Orders are reviewed periodically e) Review of orders is documented by the Head of Operations in the Order Review Log.	2) Issuing, Segregating and Reviewing Orders None
3) Removal of Orders a) Outdated orders should be removed or canceled b) Operations supervisors should review orders to assure they are current	3) Removal of Orders a) Orders are removed when appropriate by the C-AD Head of MCR. See OPM 1.2, "C-AD Documents." b) The TVDG Operations Supervisor, C-AD Head of MCR and the Head of Operations review orders to ensure they are current	3) Removal of Orders None

GUIDELINE	PERFORMANCE	EXCEPTIONS
1) Procedure Development a) Procedures should be developed to assist in the development and review of operations procedures and should include methods and formats for them 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 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	1) Procedure Development 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," C-AD OPM 1.4.2, "Format of C-A Procedures," and C-AD OPM 1.4.4, "Procedure For Implementing or Canceling Temporary Procedures." 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." 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. See C-AD OPM 1.4.2, "Format of C-A Procedures."	1) Procedure Development None
2) Procedure Content a) The following requirements should be followed to assure that the content conforms to the prescribed guidelines: i) Scope and applicability should be apparent. Emergency procedures should be easily distinguishable from other procedures by use of a color code ii) Procedures should incorporate information from appropriate reference sources iii) Prerequisites and initial conditions,	2) Procedure Content a) The following requirements are followed to assure that the procedure content conforms to the prescribed guidelines: i) Scope and applicability are apparent. See C-AD OPM 1.4.2, "Format of C-A Procedures." Emergency procedures are easily distinguishable from other procedures by use of a Chapter Number. See C-AD OPM Chapter 3, "C-AD Emergency Procedures." ii) Procedures incorporate information from the most appropriate reference source, which is the Standards Based Management System iii) Prerequisites and initial conditions, including verification of the	2) Procedure Content None

GUIDELINE	PERFORMANCE	EXCEPTIONS
including verification of the condition of the equipment to be used, should be detailed and set out in a place within the procedure which is easily found.	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 1.4.2, "Format of C-A Procedures."	
iv) Definitions should be explained.	iv) Definitions are explained; see OPM 1.3, "Definitions". In addition, each OPM has its own definitions as needed.	
v) Procedures should be easily understood and actions clearly stated	v) Procedures are easily understood and actions clearly stated; see C-AD OPM 1.4.2, "Format of C-A Procedures"	
vi) Procedures should contain only one action per step	vi) Procedure writers are requested to contain only one action per step; see C-AD OPM 1.4.2, "Format of C-A Procedures"	
vii) Procedures should contain sufficient but not excessive detail based on the skill level of those executing the procedure	vii) Procedures contain sufficient but not excessive detail and are based on the skill level of those executing the procedure; see C-AD OPM 1.4.2, "Format of C-A Procedures"	
viii) Warnings, notes, and cautions should be easily recognizable	viii) Warnings, notes, and cautions are easily recognizable; see C-AD OPM 1.4.2, "Format of C-A Procedures"	
ix) Warnings and cautions should precede the step to which they apply and appear on the same page	ix) Warnings and cautions precede the step to which they apply and appear on the same page see C-AD OPM 1.4.2, "Format of C-A Procedures"	
x) Procedures should be technically and administratively accurate and include sufficient information and correct references	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"	
xi) Sign-offs should be provided for each critical step	xi) Sign-off is provided for critical steps where appropriate; for example, search for checklists, approvals, etc. at Search.	
xii) Limits and tolerances for operating parameters should be consistent with readable accuracy of instruments	xii) Limits and tolerances for operating parameters are consistent with readable accuracy of instruments; for example, see limits in the C-A Accelerator Safety Envelopes and the associated OPM 2.5 series that are well within the readable accuracy of instruments	

GUIDELINE	PERFORMANCE	EXCEPTIONS
xiii) Criteria for surveillance or test procedures should be easily understood. If calculations are required, they should be explained xiv) Sequence of procedural steps should conform to normal or expected operational sequences xv) Procedures should incorporate human factors, such as exact references to components and documents, and include highlights of operational limits, warnings, and cautions xvi) Emergency operating procedures should consider single and multiple causalities xvii) References to procedural steps unrelated to the procedure being used should be avoided xviii) Component or system shutdown and restoration requirements following shutdown, maintenance, or surveillance should be specified	xiii) Criteria for surveillance or test procedures are easily understood. Calculations, when required, are explained. See for example OPM 6.1.2, "Responding to Chipmunk Interlocks." xiv) Sequence of procedural steps conforms to normal or expected operational sequences; see this requirement in C-AD OPM 1.4.2, "Format of C-A Procedures" xv) Procedures incorporate human factors, such as exact references to components and documents, and include highlights of operational limits, warnings, and cautions; see this requirement in C-AD OPM 1.4.2, "Format of C-A Procedures" xvi) Emergency operating procedures apply to different types of events; see C-AD OPM Chapter 3, C-AD Emergency Procedures 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 1.4.2, "Format of C-A Procedures" xviii) Component or system shutdown and restoration requirements following shutdown, maintenance, or surveillance are specified. See for example, 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."	
3) Procedure Changes and Revisions 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: i) Procedure changes should be	3) Procedure Changes and Revisions 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: i) Procedure changes are documented in a logbook readily available for	3) Procedure Changes and Revisions None

GUIDELINE	PERFORMANCE	EXCEPTIONS
documented in a logbook readily available for operator reference	operator reference	
ii) Procedure changes and revisions should be made when errors or omissions are noted	ii) Procedure changes and revisions are 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	iii) Procedure revisions are started simultaneously when a hand-processed change is made	
iv) Procedure revisions should be implemented concurrently with modifications	iv) Procedure revisions are implemented concurrently with modifications	
v) Information on changes or revisions should be communicated to operations personnel through shift briefings or through required reading	v) Information on changes or revisions is communicated to operations personnel through shift briefings, classroom training or through required reading	
vi) The reasons behind important procedure steps should be documented to assure their importance is maintained	vi) 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 1.4.2, "Format of C-A Procedures"	
vii) Procedure reviews should involve a walk-through or a similar process	vii) Procedure reviews for sweep procedures such as the C-AD OPM 4.56 Series, "Procedures for Sweeping Primary Beam Enclosures – Controlled Access," involve a walk-through	

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Procedure Approval a) Operating procedures should be approved by the Operations Supervisor b) Procedures which affect safety-related equipment and emergency procedures should be reviewed by the safety review committee of the department or facility 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 d) Temporary changes should be approved by a least two individuals, one of whom must be the Operations Supervisor	4) Procedure Approval 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." b) Procedures which affect safety-related equipment and emergency procedures are reviewed by the appropriate C-AD and/or TVDG 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." 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." 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."	4) Procedure Approval None
5) Procedure Review 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 b) Applicable procedures should be reviewed after an unusual occurrence, or other significant event c) New procedures should be walked through to ensure their workability	5) Procedure Review 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 Head of MCR issues temporary procedures. Temporary procedures are authorized for a running period, which is one year or less. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating Procedures." 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." c) New procedures are walked through to ensure their workability. See C-AD OPM 1.4, "Collider-Accelerator Department Plans, Policies and Operating	5) Procedure Review None

GUIDELINE	PERFORMANCE	EXCEPTIONS
	Procedures."	
6) Procedure Availability a) Controlled copies of procedures should be maintained in control areas for operator reference, and in other areas as appropriate b) Working copies should be controlled and a system put in place to ensure outdated procedures are replaced	6) Procedure Availability a) Controlled copies of the C-AD procedures are maintained for operator 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." 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.	6) Procedure Availability None
7) Procedure Use a) The requirements for using the procedures should be understood by all operators 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	7) Procedure Use 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." 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.	7) Procedure Use None

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 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 Head of the Main Control Room approves of all operator aids. See 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) Aids may be viewed via computer "windows" at each of the five control consoles in the MCR. They do not obscure any instruments or controls. Aids are protected and properly secured by the Head of the Main Control Room.	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.	4) Use of Aids None
5) Documentation a) A listing of all approved operator aids should be maintained and audited	5) Documentation a) An operator-aid index is on the Operation's Web-site. Aids are maintained and audited by the Head of the Main Control Room.	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) Operator aids are reviewed periodically by the Head of the Main Control Room. 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 Design Criteria for Research and Development Electrical Equipment. 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 b) Labels should be oriented for easy reading	3) Label Placement a) Labels are placed on or as near as possible to equipment to be labeled b) Labels are oriented for easy reading	3) Label Placement None

GUIDELINE	PERFORMANCE	EXCEPTIONS
4) Replacing Labels a) Identifying Lost or Damaged Labels 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 i) There should be methods and facilities to create required labels ii) Replacement of labels or attachment of temporary labels should be verified	4) Replacing Labels a) Identifying Lost or Damaged Labels 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 i) There are methods and facilities to create required labels ii) Replacement of labels or attachment of temporary labels is verified	4) Replacing Labels None