Conduct of Operations (COO) for JLAB Hall C Experiment E07-003 - November 20, 2008

Contents

1 Preface **2**

2 Documentation **2**

3 Organization and Administration **3**
- 3.1 Run Coordinator . . . 3
- 3.2 Physics Division Liaison . . . 6
- 3.3 Hall Work Coordinator . . . 7
- 3.4 Shift Leader . . . 7
- 3.5 Shift Member . . . 8
- 3.6 Shift Personnel Training . . . 9

4 Operating Procedures **10**
- 4.1 Shift Routines . . . 10
  - 4.1.1 Operating Shifts . . . 10
  - 4.1.2 Standby Shifts . . . 10
  - 4.1.3 Operations Turnover . . . 11
  - 4.1.4 Timely Orders to Operators . . . 11
  - 4.1.5 Operator Aid Postings . . . 11
- 4.2 Hall Access . . . 11
- 4.3 Collaboration Request for Laboratory Resources . . . 12
- 4.4 Scheduling of Work by Outside Groups . . . 13
- 4.5 Control of Equipment and System Status . . . 13
- 4.6 Possible radiation contamination of Equipment in the Hall . . . 14
- 4.7 Independent Verification . . . 14
- 4.8 Logkeeping . . . 15
- 4.9 Scheduling of Work during the Decommissioning Phase . . . 15

A Special Procedures for Hall C **16**
- A.1 Badge Reader Physical Access Control . . . 16
- A.2 Pivot Area Access . . . 16

B Special Procedures for E07-003 **18**
- B.1 Transition to Restricted Access . . . 18
- B.2 Work on the lower platform . . . 19

1 Preface

As part of its mission, JLab provides the resources necessary for international collaborations of scientists to carry out basic research in nuclear physics and related disciplines. This research must be conducted in a manner that ensures that environmental, health and safety (EH&S) concerns receive the highest consideration. At the same time the programmatic goals of the laboratory require that it produce the highest quality physics results efficiently.

Guidance on how to balance thoughtful, measured EH&S concerns with efficient operation has been taken from the JLab EH&S Committee, the JLab EH&S Manual, and the JLab Director's Office. A graded approach is followed in which the measures taken are matched to the scale, cost, complexity, and hazards of the operation.

The collaboration formed to carry out JLAB Experiment E07-003 firmly supports the concept that quality physics is compatible with safe operation of the JLAB Facilities. This document outlines how approved experiment collaborations will conduct operations in a safe and effective manner during the time period that experiment E07-003 is on the floor. Installation and commissioning periods are not covered by this document. Furthermore, this document is directed to physics users and physics staff rather than the Hall C technical staff. It must be read, understood, and followed by all members of the collaboration.

2 Documentation

This experiment uses the standard Hall C equipment, including the beam transport system, beam dump, the High Momentum Spectrometer (HMS), the Moller Polarimeter, the Hall C electronics and data acquisition system. In addition, this experiment will use a specifically designed polarized target at the pivot and a large electron detector "Beta" located on the Hall C floor. In order to accommodate the polarized target the beam line has been altered to include a magnetic chicane, an SEM for beam monitoring, a downstream Helium Bag and in-hall local beam dump. With the exception of these items, all of the required equipment is part of the "base" equipment in the Hall. All of the procedures to be used during the course of the experiment are contained in the following documents: [1]

- The Conduct of Operations for JLAB Experiments E07-003 (this document).
- Experiment Safety Assessment Document (ESAD) for E07-003 (referring to the base equipment as well as any experiment-specific changes).
- Radiation Safety Assessment Document (RSAD).

[1] The process is documented at http: //www.jlab.org/user_resources/PFX/.

- Hall C Experimental Equipment Operations Manual (EEOM). [For Hall C, the safe equipment operations are listed in a more convenient manner at http://hallcweb.jlab.org/document/howtos/]
- Personnel Allowed to Operate Hall C Equipment.
- JLAB Emergency Response Plan.
- Polarized Target Handbook 2008.

Reference copies of these documents will be available in the Counting House for the duration of the experiment. The present document shall hereafter be referred to as the COO. The Experiment Safety Assessment Document shall hereafter be referred to as the ESAD, and the Radiation Safety Assessment Document shall be referred to as the RSAD. The ESAD and COO may also be available on the WWW at an experiment-specific web site. **The COO, the ESAD and the RSAD are required reading for shift personnel.**

The primary physics goal of this experiment is to measure precise inclusive spin asymmetries of the proton at large Bjorken x. In the DIS region, A_1^p and g_2^p will be determined up to x=0.63 assuming 6 GeV beam energy. A full description of the physics motivation for the experiment and the general plan for carrying out the experiment can be found in the 2003 proposal[2] to the JLAB Program Advisory Committee (PAC24).

3 Organization and Administration

The operation of the experiment is directed by the Spokespersons and the Hall Leader, Steve Wood. An organization chart for the experiment is found in Figure 1.

3.1 Run Coordinator

The Run Coordinator is the immediate on-site manager of the experiment and is responsible for ensuring that the physics goals of the experiment are met. This individual is designated by the experiment spokespersons and approved by the Hall Leader. The Run Coordinator shall ensure that the Hall Group Leader, Physics Division Liaison, and at least one Spokesperson are aware of all pertinent issues. The Run Coordinator shall promote an environment in which the highest safety standards are maintained. The functions of the Run Coordinator are:

I. To manage daily operation of the experiment:

- to ensure that the run plan is clear to the shift workers.

[2]Downloadable from: http://www.jlab.org/∼rondon/sane/files/sane_pac24.ps.gz. See also: http://www.jlab.org/∼rondon/sane/docs/sane_update_pac31e.pdf

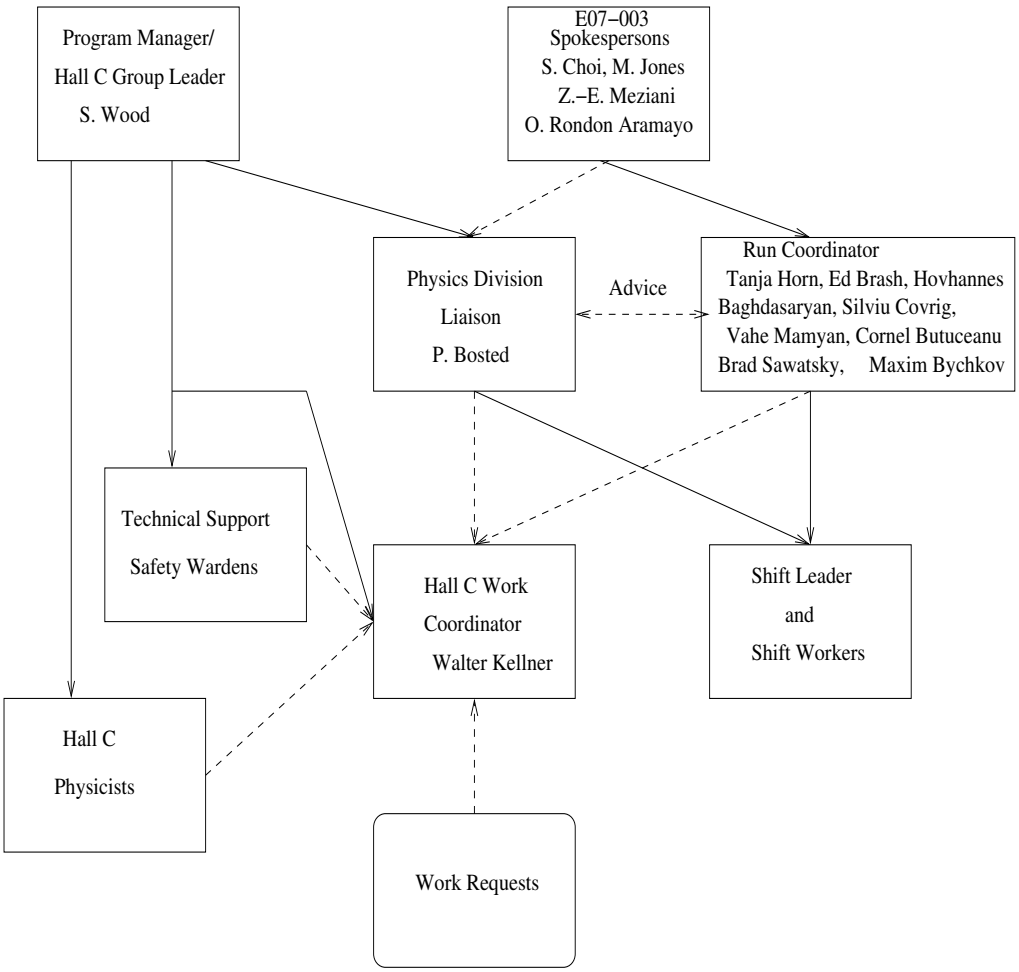

Figure 1: Functional Organization of the Hall C Team. Dashed lines indicate information flow, solid lines indicate responsibility.

- to define the data quality appropriate for the goals of each shift.
- to track the progress of the experiment with regard to the run plans, in particular to maintain a running count of events weighted by the asymmetry figure of merit (as soon as this becomes possible).
- to coordinate and schedule activities (e.g., Hall accesses) in order to optimize productivity.
- to ensure that an experiment checklist is completed every 24 hrs during standby shifts.
- together with the Physics Division Liaison, to ensure that the counting house is manned appropriately: i.e., sufficient personnel are present to safely carry out the experimental program or monitor the apparatus as needed.

II. To coordinate interactions between JLAB and the experiment. This entails:

- to ensure that the Hall C Group Leader and Experiment Spokespeople are aware of all necessary issues.
- to coordinate with the various system leaders (Beta detector, polarized target, beam polarimeter, data acquisition, and data analysis) and schedule activities such as Moller runs, target anneals, thermal equilibrium measurements and Hall accesses to optimize productivity.
- informing the Program Deputy of the experiment's status and plans at a 7:45 AM meeting in the MCC during the working week, and at an agreed upon time on weekends or holidays.
- representing the collaboration at the 8:00 AM meetings in the MCC during the work week.
- attending the 1:30 PM Wednesday scheduling meeting in the MCC conference room to represent the collaboration and to present a report on the proceeding week.
- remaining in the local area and being available by cell-phone/pager at all times. (If temporarily unavailable the Run Coordinator must designate another qualified collaborator as a replacement.)
- to maintain the "Access Authorization List" (a list of individuals who are to be allowed entry to Hall C when the Hall is in Controlled Access or during maintenance) and ensure that MCC has an up to date list.
- in conjunction with the Hall Work Coordinator, scheduling work by groups outside the collaboration. This work will normally coincide with the scheduled machine maintenance days. This coordination requires a weekly meeting of these two individuals. The product of this meeting will include any neccessary updates to the "Access Authorization List".

- interact with the Accelerator Program Deputy to plan and conduct unscheduled activities.
- to act as the **single point of contact for Unlisted Workers (workers not on the "Access Authorization List") who need access to the Hall and to determine if the Hall is in a state such that the work can be done safely.** The Run Coordinator shall inform the shift leader on duty of the workers scheduled arrival and discuss the impact of the scheduled work with the Target Coordinator.
- to serve as the only person who can authorize work by anyone on the lower target platform; this should be done in consultation with the Target Coordinator.
- to be responsible for safe transition of the Hall to Restricted Access.
- to provide an oral report at the weekly Hall C meeting[3] updating the experimental progress to the collaboration.

III. To submit a written report to the Hall Leader which includes run time statistics and a description of any significant problems with the Hall instrumentation.

3.2 Physics Division Liaison

The Physics Division Liaison to the experiment is a Hall C staff member selected by Steve Wood to oversee the Hall's interests with respect to personnel and equipment protection.[4] This is true for all three Halls. However, the role of the Physics Division Liaison may include other responsibilities depending upon the experiment and other factors. His/her responsibilities include:

- Oversee that proper rules of safety are carefully followed in the conduct of the experiment.
- Approve a Hall status change to Restricted Access in coordination with the Hall Work Coordinator.
- Training verification of shift workers.
- Together with the Run Coordinator, ensure that the counting house is manned appropriately: i.e., sufficient personnel are present to safely carry out the experimental program or monitor the apparatus as needed.

[3] typically held at 3pm on Monday.

[4] The responsibilities described here correspond to those of the Physics Division Liaison during the operating phase of the experiment as outlined in the EH&S Manual Chapter 3120/Glossary.

3.3 Hall Work Coordinator

The Hall Work Coordinator's responsibilities are:

- to act as the **single point of contact for all work in the Hall.**
- to determine if the scheduled activities in the Hall can be done safely. These activities shall be coordinated with the Physics Division Liaison and the Run Coordinator.
- to ensure that workers are properly trained, are familiar with all significant hazards, and are aware of all applicable work control documents associated with the project.
- in coordination with the Physics Division Liaison, ensure that the Hall apparatus is made safe before giving permission to make a transition to Restricted Access (e.g., turn off unused magnets, install protective shields as needed, fulfill specific requirements in the ESAD, etc.).

3.4 Shift Leader

Each shift is led by a Shift Leader. The selection of shift leaders is the responsibility of the Run Coordinator and Physics Division Liaison. The Shift Leader has the following responsibilities:

- to carry out the scientific program planned for the shift in a safe and efficient manner.
- to ensure that the logbook contains a complete and accurate description of the events and actions which occurred during the shift.
- to serve as primary contact between the machine control center (MCC) and experiment personnel. This includes authority to request that the state of the Hall be changed from Beam Permit or from Restricted Access to Controlled Access. Request for a change of status to Restricted Access must be approved by the Run Coordinator.
- Overall responsibility for the proper operation of the Hall C equipment during the shift.
- to ensure the shift checklist is performed every eight hours on operating shifts.
- Primary responsibility to ensure that malfunctioning equipment is properly labeled, to ensure that the existence of the malfunction is communicated to shift personnel and the individual(s) responsible for the operation and maintenance of the equipment, and to ensure, if necessary, the equipment is locked-out by a trained responsible individual.

- Workers from outside groups (such as survey and alignment) are asked to stop by the counting house before entering the Hall when the Hall is in Controlled Access. It is the shift leaders duty to note the work being done in the logbook and to verify that the proper communication with the Run Coordinator has occured.
- to coordinate the response of the shift crew to any emergency situation, including the notification of appropriate individuals as outlined in the JLAB Emergency Response Plan.
- to ensure that in any emergency situation the experiment Physics Division Liaison, Run Coordinator, and Hall Leader are notified immediately.
- to notify the Run Coordinator and the Hall Leader, if the Hall is down due to equipment failure for more than four hours.
- Primary responsibility for orderly transition of crews at shift change and writing the end-of-shift summary. This summary shall include the existence of any new documents pertaining to the experiment.
- Primary responsibility for the actions of shift crews under thneir leadership.

The Shift Leader has the following authority:

- to assign tasks to the shift members as needed.
- to request that the state of the Hall be changed (Request for a change to Restricted Access must be approved by the Physics Division Liaison.)
- to limit the number of people in the Counting House or Hall if required to effectively and safely carry out the experiment.
- to limit access to Hall on-line computers if required to effectively and safely carry out the experiment.
- to authorize qualified personnel to make modifications in the experiment configuration within the allowed parameters, as specified in the EEOM.
- to authorize time accounting for the shift.
- Can authorize work in Hall in all locations **except the lower platform** or where other restrictions apply (such as posted radiation areas).

3.5 Shift Member

The responsibilities of each shift member are to:

- carry out the scientific goals of the shift in a safe and efficient manner under direction of the shift leader.

- read the logbook to be aware of changes in goals, operating parameters, and new documentation.
- monitor the equipment for problems.
- maintain adequate records of the progress of the shift.
- be present before the start of each shift and coordinate current operating conditions with the previous shift.
- keep all training up-to-date.

In addition, each shift member is responsible for carrying out their work in a safe and efficient manner, according to the rules and procedures documented in the JLAB EH&S Manual and in the Hall C and experiment documents listed above.

If the polarized target contains cryogens then a person designated as the Target Operator shall be present in the counting house. Target Operators are individuals who have received training from the Target Coordinator. The Target Coordinator is a rotating position. Only two individuals in the collaboration are qualified: Donald Crabb and Donal Day.

3.6 Shift Personnel Training

All personnel on shift are required to have successfully completed and be current in the following JLAB safety training:

- EH&S Orientation (SAF 100)
- Radiation Worker Training (SAF 801)
- Oxygen Deficiency Hazard Training (SAF 103)
- Hall C Safety Awareness Walk-Through (SAF111)
- Conduct of Operations (SAF122)

All experiment personnel are required to have radiation badges in their possession during their shifts. The Safety Awareness Walk-Through will emphasize any hazards that are peculiar to the current experimental setup. In addition, all shift personnel will be trained in the safety procedures to be followed for access to the Hall. This training will include a brief discussion of the purpose and operation of the Personnel Safety System (PSS) for the Hall.

Individuals within the collaboration may be required to have other, equipment or procedure-specific training. The need for such training shall be determined by the experiment spokesperson in consultation with the Hall Leader and Physics Division EH&S personnel.

In addition, experiment personnel must familiarize themselves with the sections of the JLAB EH&S Manual relevant for their work in the Hall. A reference copy of this document is available via http://www.jlab.org/ehs/manual/EHSbook.html

Finally, JLAB Lock and Tag[5] training is required for all staff/users who will be performing maintenance on electrical and mechanical equipment which cannot be physically and verifiably isolated from an energy source.

All experiment personnel must record their familiarity with the ESAD and COO documents by an email message to rondon@jlab.org or bosted@jlab.org.

4 Operating Procedures

4.1 Shift Routines

There are two types of shifts for the time when the experiment is designated as occupying Hall C: Operating and Standby. Operating shifts are the normal status when beam is available for the experiment. Standby shifts are periods designated by the Run Coordinator when beam is not available or not in use in the Hall and none of the equipment, except for the target, requires continuous monitoring. Standby status may result from normal operational planning or from abnormal conditions such as a major down time due to equipment failure.

4.1.1 Operating Shifts

During operating shifts, 24 hour occupation of the counting house area will be maintained by crews of at least two persons [6] in 8 hour shifts. One person per shift is designated as the Shift Leader.

The number of persons assigned to a shift will depend on the tasks assigned during the shift. A shift schedule will be posted in the Counting House listing the times and names of personnel on shift and identifying the Shift Leader and Run Coordinator. The shift schedule may be available at an experiment-specific website. The Run Coordinator may also designate and supervise other teams for duties such as offline analysis. These secondary teams will also be under the control of the Shift Leader and will each have a designated secondary leader.

4.1.2 Standby Shifts

During Standby shifts, shift personnel are not required to be on site at JLAB but must be available through telephone contact to come in if they are needed. Monitoring the target system can require the presence of a Target Operator during a standby shift. The Target Operator then also acts as Shift Leader. The Run Coordinator will ensure that the shift checklist is executed at least once every 24 hours.

[5] The EH&S Manual provides Lockout/Tagout information in Chapter 6110.

[6] The readiness review committee may require more personnel depending on the complexity of the experiment. Two people are the minimum required for safe operations.

4.1.3 Operations Turnover

The electronic log book, accessible from the web, is a very effective means of remotely obtaining information about experimental operations. This allows experimenters to log in remotely and view all log book entries prior to commencing their shift.

Efficient and effective shift changeovers during experiment operation are enhanced by overlapping shifts. Therefore, whenever possible, shift leaders and workers are scheduled in shifts that are staggered by four hours, leading to an overlap of half a shift.

4.1.4 Timely Orders to Operators

The initial run plan is the responsibility of the Run Coordinator and shall be clearly recorded in the log book. This plan specifies the tasks to be performed in the next 48 - 72 hours, including any special conditions or data runs, updated documentation and its location and/or alternate plans. Any changes to the run plan shall be recorded in the log book and the white board in the counting house.

4.1.5 Operator Aid Postings

The day-to-day schedule, contact instructions for key personnel, and any other information relevant to current activities are located on the white board in the Counting House. Shift personnel should consult the white board, especially at the beginning of their shift, to be aware of any updates to current running conditions.

Information pertaining to activities in Hall C must be posted on the bulletin board or written on the white board at the entrance to the Hall.

4.2 Hall Access

Access to the Hall will be governed by the JLAB Beam Containment Policy[7], and work in designated radiation areas will be carried out in accordance with the JLAB RadCon Manual. In particular, no material may be removed from the Hall after beam delivery without proper approval from the RadCon Group.[8] During operations, no one is allowed in the Hall without either being accompanied, or informing shift personnel and checking in on a regular basis.

During a running experiment the Hall will normally be in Beam Permit. When temporary access to the Hall is needed the Shift Leader can ask the MCC to bring the Hall to Controlled Access. If long term access to the Hall is required, the Shift Leader may request the Hall be brought to Restricted Access. Such a request requires prior approval from the Physics Division Liaison, while the actual transition will be supervised by the Hall Work Coordinator.

[7] EH&S Manual, Appendix 6310-T2.

[8] For Hall B, approval is only required for equipment along the beamline. For Hall A, approval is not required for equipment inside the detector shielding huts.

Only individuals who are named on the "Access Authorization List" may enter the hall during Controlled Access. This is a list maintained by the Spokespeople and their surrogate, the Run Coordinator. Persons on the list are judged by the above to be fully cognizant of all safety hazards associated with their work in the hall. MCC operations personnel will serve as the gate keepers and will refuse access to unlisted workers. The "core" list will contain the names of individuals who have read this document and the ESAD and have stated so in writing. In addition, the MCC ARM's and members of the RadCon group will receive an abbreviated hazard awareness document. Additions, perhaps temporary, will be made as needed after ensuring that the individuals have received adequate hazard awareness training. An escort may be required.

Restricted Access is a state where delivery of beam and/or RF power is not permitted, and entry to and exit from the Hall is not controlled by the Personnel Safety System. This is the normal state of the Hall when the accelerator is off and no experiments are running. Access is "restricted" only in the sense that the Hall is not open to the general public. Well-defined check-list procedures are to be followed whenever the Hall is brought to and from Restricted Access.

Restricted Access is the period when all major work must be completed in the Hall. Consequently, all activities require advanced planning and must be scheduled for resources and safe operation. In order to streamline the activities in the Hall and ensure everyone has ready access to the current status and requirements for work, there are two important resources:

- Single point of contact, which is the "Hall Work Coordinator"
- Information board at the entrance to the Hall

All work must be scheduled through the Hall Work Coordinator. The content on the information board is the responsibility of the Hall safety wardens and the Hall Work Coordinator. The information board will contain all critical information required for safe entry into the Hall. This information will include a succinct, one page safety summary covering the Hall's current safety hazards and mitigating measures (to be read by all persons working in the Hall), active Operational Safety Procedures (OSPs) and Temporary Operational Safety Procedures (TOSPs), required temporary work permits (e.g., Radiation Work Permits), current activities in the Hall, points of contact, and required training and safety equipment.

The two–person rule will be observed for all entries into the Hall. No one is allowed in the Hall without either being accompanied or without informing someone in the counting house and checking in with that person on a regular basis. This rule applies at all times regardless of the access state of the Hall.

4.3 Collaboration Request for Laboratory Resources

The collaboration is free to request additional services from accelerator division through their accelerator liaison Hari Areti. The collaboration is free to request additional services from Hall C personnel.

Significant maintenance and/or major planned configuration modifications require the notification and concurrence of the physics liaison Peter Bosted[9]. He is the primary contact for obtaining major resources from the laboratory that the experiment requires. The physics liaison may refer an issue to a Hall C engineer or appropriate accelerator division personnel and may require that a TOSP be developed. Example: A survey or a change in the chicane angle as outlined in the physics proposal.

Major abnormal or unanticipated configuration modifications such as the stacking or movement of significant shielding, unanticipated vacuum work, unanticipated beam line modifications, the replacement of an HMS chamber, etc. require notification and approval of the Hall Leader, Steve Wood, see footnote 9, prior to beginning work and the use of appropriate personnel. The Hall Leader may refer this issue to the liaison physicist, a Hall C engineer or appropriate accelerator division personnel and may require that a TOSP be developed.

4.4 Scheduling of Work by Outside Groups

Work in the Hall that is to be performed by groups outside the collaboration such as work by survey and alignment, plant services, air conditioning or other outside vendors must be scheduled so that it does not interfere with the experiment, endanger personnel or equipment. Non-emergency activities by these groups will be scheduled to coincide with the planned accelerator maintenance periods. In order that work proceeds in the most efficient manner a representative from the collaboration and a representative from the Hall will both concur on the scheduling. The Run Coordinator will represent the collaboration and the Hall Work Coordinator will represent the Hall.

To facilitate this communication between the Work Coordinator and the Run Coordinator they will arrange a weekly meeting at which they will plan the work scheduled for the upcoming maintenance period. The product of this meeting will be a list of individuals requiring access to the Hall, the work they are doing, the Hall Access state required (Controlled or Restricted) and the educational or other safety measures (such as escorts) that are needed for these workers. This list will be temporarily incorporated into the "Access Authorization List" if the work is compatible with Controlled Access.

If the work necessitates Restricted Access then the Hall Safety Warden shall be present in the Hall during working hours. After working hours the state of the Hall will be returned to Controlled Access or the Mag Locks will be engaged.

4.5 Control of Equipment and System Status

The operation of the experimental equipment is documented in the Hall C Experimental Equipment Operations Manual. This document includes information

[9] Configuration changes as outlined above can affect site boundary dose and the production of airborne radioactivity. They require consulting with RadCon or EH&S personnel, as appropriate

on the normal response to alarms and equipment malfunctions. Supplementary information specific to experiment E07-003 may be found in the ESAD.

During Hall activities the only individuals authorized to make significant modifications, repairs and/or changes to the operating status of equipment are the resident "experts" or persons under their direct supervision. Note: significant changes to the operating status of equipment include any changes within the stated safe parameters of operation in the operating procedures that are beyond those described in The Operating Safety Procedures for the Hall as routine. Shift personnel will make routine changes in operating conditions as specified in the operating procedures. The document "Personnel Allowed to Operate Hall C Equipment" lists the authorized subsystem experts. This list may be amended as necessary to reflect personnel and training changes with the signed authorization of the subsystem expert. A copy of these amendments will be attached to the main document and kept in the Counting House.

All general equipment installation, maintenance, and testing activities are to be carried out in accordance with the JLAB EH&S Manual. The experiment and Hall equipment shall be properly labeled so it can be quickly identified by both shift and maintenance personnel. Proper labeling helps prevent incorrect operation or modification of equipment by non-experts and facilitates proper and efficient operation by qualified personnel. Labeling also increases the likelihood that proper procedures will be followed in case of emergency. Improper labels should be corrected immediately if possible. Otherwise, the Shift Leader should be notified so that correct labeling can be requested from the qualified expert.

4.6 Possible radiation contamination of Equipment in the Hall

Items that have been present in Hall C during beam delivery may not be removed from the Hall without first obtaining permission from the RADCON group.

Experimenters are reminded that the ventilation fans of electronic equipment in the hall can accumulate dust that may be activated. Caution is urged when servicing or otherwise interacting with these components. Any and all questions should be directed to the RADCON group.

4.7 Independent Verification

A basic checklist will be performed once a shift during operating shifts and once a day during standby shifts.

The Run Coordinator will define a set of quality measures for the experimental data and communicate these to the shift crews. These measures may change in the course of the experiment. Hall C Procedures for Experiments provide more general check lists for closing the experimental Hall and conditions when the Hall is used as an accelerator dump.

4.8 Logkeeping

A computer log will serve as the record of the experiment. All relevant activities are to be recorded, in this searchable log book, including all changes of experiment conditions and equipment failures. The quality of the information recorded in the Log Book is often critical to the ultimate ability of the collaboration to "make sense" out of the data through careful correlation of events in the written "history" of the experiment with apparent changes in the experimental conditions as inferred from changes in the data stream. Additional information can be written in the continuing series of hard bound Log Books.

The computer log book will also serve as the primary reference for the determination of the operational efficiency of the experimental apparatus in Hall C; as such it is essential that it provide an accurate record of the capability of the equipment to carry out the intended research pro-gram. Finally, the computer log book is the place of record for all safety issues and notification of new or updated documentation and procedures.

All data recorded electronically will be referenced in the computer log book with the location of the appropriate files and media. The only exception to the computer log book as the place of record is the experiment checklist, which will be stored in binders in the counting house. All deviations from normal operating parameters observed during the checklist will be recorded in the log book. All log books will remain in the counting house for the duration of the experiment (unless they are being copied.)

4.9 Scheduling of Work during the Decommissioning Phase

The collaboration may request additional services after the experiment has been completed, e.g., for survey and alignment, target measurements, or removal of equipment. Such requests shall be made through the Physics Division Liaison, Peter Bosted, who will coordinate this with the Hall C Work Coordinator.

The decommissioning phase of an experiment will often imply major and abnormal configuration modifications such as beam line modifications, movement of significant shielding, the replacement of user-supported equipment, etc. Such configuration changes can affect site boundary doses and the production of airborne radioactivity. They require consulting with RadCon or EH&S personnel, as appropriate. Any user activities during the early phase of decommissioning that involve such a configuration modification require prior approval by EH&S personnel.

A Special Procedures for Hall C

A.1 Badge Reader Physical Access Control

General physical access to Hall C is restricted by a full time badge reader system. The badge reader limits non-emergency hall access to those individuals on the access lists. The Hall Leader maintains the data base, with input from the Physics Division Liaison, the experiment run coordinator, the Hall C work coordinator, the Hall C safety warden, and physics division safety personnel. As a part of the general access control the Physics Division Liaison working with the collaboration management will collect names of those who state by signature that they have read and understood the COO and ESAD.

The badge reader based security system is in addition to the engineering and administrative controls discussed previously. Specifically, to gain physical access to the hall requires the logical .AND. of all engineering based access control systems. If the hall is in a "Restricted Access" , the maglock will release after a valid badge is scanned by the badge reader. Badges and access privileges are assigned to individuals. Letting individual(s) into the hall via a badge not assigned to them will be treated as the circumvention of a laboratory safety system. Arrangements will be made to have one guest badge available which can be used to escort one fully-trained Hall C Staff member or experimental collaborator into Hall C, who has lost or not yet received his/her badge. Exceptions include formal prearranged and approved guided tours or escorting of a visitor who has a RADCON issued dosimeter.

If the hall is in "Controlled Access" those seeking entry must also request access with MCC (generally by the phone near the door) simultaneously with the badge scanning to unlock the outer Hall C personnel door. The MCC cannot override the badge reader's data base and a valid badge does not guarantee that the MCC will allow entry into Hall C. The badge reader's data base of authorized individuals is not static and may be modified as appropriate for the activities underway in the hall at that time.

A.2 Pivot Area Access

For many Hall C experiments, guard rails have been placed at the perimeter of the pivot area. In such a configuration, access to the pivot area only requires permission of the Hall C Work Coordinator (note that hearing and eye protection may also be required, this will be posted at the pivot entrance). For Hall C experiments that require frequent movements of the HMS and/or SOS spectrometers, the pivot guard rails may have been removed. In this case, the pivot area and access to it is in addition restriced to those individuals on the pivot area work Operating Safety Procedures (OSP) authorized list. This applies at all times including during controlled access entries. The list will be restricted to those with critical skills with a real need to access the pivot area. The access name list "gate keeper" is the Hall C Work Coordinator. All access to and work on the pivot area must be performed in accordance with the pivot area work

OSP.

B Special Procedures for E07-003

Hall C Experiment E07-003 is a major experiment requiring components and apparatus that are not part of Hall C's standard equipment. These include a polarized ammonia target. The target operations are under computer control in the counting house. The equipment and safety issues specific to E07-003 are documented in the E07-003 Experimental Safety Assessment Document.

E07-003 also requires modification to the beamline. E07-003 requires the installation of the upstream chicane magnets. This modification will be put into place in coordination with the accelerator beamline optics group in accordance with their safety and operational procedures.

B.1 Transition to Restricted Access

E07-003 will operate under a restrictive process for changing the status of the hall from Controlled to/from Restricted Access. It is inevitable that some activities or the condition of the accelerator will require that the state of the hall be changed to Restricted Access. Even in Restricted Access, work on the lower platform is still regulated by signs on the 5 Gauss barrier that indicate the necessity to contact the Run Coordinator for entry. In addition, The Hall C Work Coordinator or a designee shall supervise all work in the hall while the magnet is cold and the hall is in Restricted Access. If deemed necessary, the Hall Work Coordinator may designate a Hall C technical staff person to remain in the hall while the work is ongoing.

Rules govern the transition to Restricted Access. These rules, enumerated below, will be posted in the Hall C counting house. These requirements do not apply in the caseof an emergency.

- The transition from Controlled to Restricted Access can only occur after approval is received by accelerator operations from the experiment Shift Leader. If no shift is underway the experiment Run Coordinator may designate himself/herself as the acting Shift Leader. The laboratory recognizes only the experiment Shift Leader as the individual authorized to request a change in condition of the Hall. This individual must be on site and have the verbal concurrence of either the Hall C Work Coordinator or Physics Liaison prior to issuing his/her request to the MCC. The Boolean logic for this condition is given below:

  ACCESS = Shift Leader* .AND. (Physics Liaison .OR. Work Coordinator) = .TRUE.

  The experiment has additional requirements internal to the collaboration which need to be satisfied prior to the Shift Leader issuing his/her request to the MCC. This includes a verbal approval by the experiment Run Coordinator. The Boolean logic for this condition is given below:

  Shift Leader* = Shift Leader .AND. Run Coordinator = .TRUE.

- To prevent potential damage to the polarized target magnet by de-energizing it the magnet will normally remain energized during Restricted Access.
- The magnet will only be de-energized when work on the lower platform (pivot) is deemed absolutely necessary for the progress of the experiment. Examples of such work are rotation of the polarized target, maintenance of the Secondary Emission Monitor (SEM) target beam position monitor or replacement of the Cherenkov or Forward tracker phototubes.
- All work in Hall C during Restricted Access is regulated by a TOSP "Operate Hall C (SANE) Polarized Target Magnet". All personnel entering Hall C must have read and signed this TOSP.
- The Run Coordinator must arrange for the Hall C Safety Warden or his designee to supervise the activity that necessitated the change. The state of the hall should revert to Controlled Access or Badge Reader control with Mag Locks Energized when work allows or at the end of the working day.

The time order is: Via the process above the Shift leader determines that the hall state must change to Restricted Access. Then, a complete radiological survey can take place, with the exception of the pivot area, where work is never allowed at any time the magnet is energized. The Shift Leader communicates this request to MCC and the state of the hall can be altered. Finally, the Hall C Work Coordinator (or his designee) must supervise the activity that necessitated the change. If deemed necessary, the Hall Work Coordinator may designate a Hall C technical staff person to remain in the hall while the work is ongoing.

B.2 Work on the lower platform

All work on the lower platform will be done in Controlled Access. If work on the lower platform is required, the Run Coordinator must:

- The Run Coordinator must arrange that the target field is de-energized and arrange that the serial line that allows remote communication with the target magnet power supply is disconnected from the supply. The Target Coordinator or his/her designee will de-energize the magnet and disconnect the serial line.
- In addition, after the target field is de-energized, the Run Coordinator must arrange that the positive magnetic lead be removed from the supply. The Target Coordinator or his/her designee will lock the lead connector in a manner compliant with Jefferson Lab's lock and tag policy.
- The Run Coordinator must arrange that all vacuum window shields are in place (Typically no window covers should need installation. However their integrity should be affirmed). The Hall C Work Coordinator or his/her designee is charged with the inspection of the window coverings. If this

requires access to the lower platform, this individual shall wear hearing protection and a face shield while performing this operation.

The time order is: Via the process above the Shift leader determines that work on the lower platform is required. The Run Coordinator or the Shift Leader requests that the Target Coordinator or his/her designee ramp the target field down. Once the field is down, the Target Coordinator or his/her designee will disconnect the serial line for remote control of the magnet power supply. The Target Coordinator or his/her designee must then unplug and lock the positive lead to the magnet power supply. The Hall C Work Coordinator (or his designee) and an ARM can enter and visually inspect the window coverings. Then, a complete radiological survey can take place. Finally, the Hall C Work Coordinator (or his designee) must supervise the activity that necessitated the change. If deemed necessary, the Hall Work Coordinator may designate a Hall C technical staff person to remain in the hall while the work is ongoing.