DRAFT - Conduct of Operations (COO) for JLAB Hall C Experiment E-01-006 - November 12, 2001

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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.

This document outlines how approved experiment collaborations will conduct operations in a safe and effective manner during the time period that experiment E-01-006 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.

The collaboration formed to carry out JLAB Experiment 01-006 firmly supports the concept that quality physics is compatible with safe operation of the JLAB Facilities.

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. In order to accommodate the polarized target the beam line has been altered to include a magnetic chicane. With the exception of these two 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 E-01-006 (this document);
- Experiment Safety Assessment Document (ESAD) for E-01-006 (referring to the base equipment as well as any experiment-specific changes);
- Radiation Safety Assessment Document (RSAD);
- Hall C Experimental Equipment Operations Manual (EEOM);

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

- Personnel Allowed to Operate Hall C Equipment ;
- JLAB Emergency Response Plan;
- Polarized Target Handbook 2002;

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 E-01-006 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 the nucleon spin asymmetries $A_1^{p,d}$ and $A_2^{p,d}$ at a an average four-momentum transfer $Q^2 \sim 1.3$ GeV^2 and the spin asymmetry A_{TT} at $Q^2 \sim 5.0$ GeV^2 . A full description of the physics motivation for the experiment and the general plan for carrying out the experiment can be found in the 1997 proposal to the JLAB Program Advisory Committees (PAC11), and its 2001 update to JLAB PAC19. A list of the collaborators involved in the experiment is provided in Appendix A.

3 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 (SAF112)

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 in the main hallway of the Counting House. It is also available via http://www.jlab.org/ehs/manual/EHSbook.html.

Finally, JLAB Lock and Tag[2] 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.

4 Organization and Administration

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

4.1 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.
- to define the data quality appropriate for the goals of each shift.
- to track the progress of the experiment.
- 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:

- 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.

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

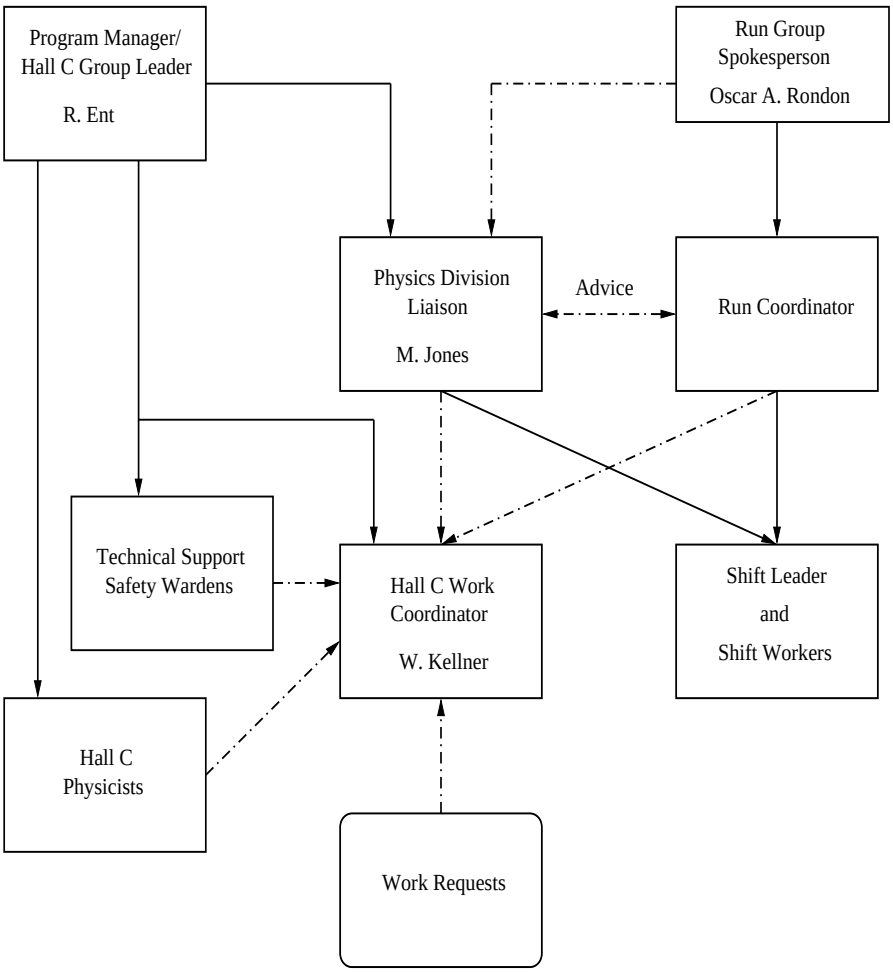

Figure 1: Functional Organization of the Hall C Team. Dashed lines indicate information flow, solid lines indicate responsibility.

- 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.)
- in conjunction with the Hall Work Coordinator, scheduling work by groups outside the collaboration.
- interact with the Accelerator Program Deputy to plan and conduct unscheduled activities.
- present a report at the Hall C weekly meeting.

4.2 Physics Division Liaison

Broadly speaking, the Physics Division Liaison to the experiment is a Hall C staff member selected by the Hall C Group Leader to oversee the Hall's interests with respect to personnel and equipment protection.[3] 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.
- Consult with the experiment Shift Supervisor and approve, as deemed prudent, requests to change the status of the hall from Controlled to Restricted Access. The approval should only be given after consultation 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 babysit the apparatus as needed.

Currently the Physics Division Liason for E-01-006 is Mark Jones.

[3]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.

4.3 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 and the Run Coordinator, 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.).

Any special conditions which apply to this experiment can be found in the appendix.

4.4 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.
- to oversee that hall equipment is operated properly.
- to ensure the shift checklist is performed every eight hours on operating shifts.
- to ensure that equipment malfunctions are properly labeled and locked-out if necessary and to communicate this to shift personnel and subsystem experts.
- to note in the logbook when workers from outside groups (such as survey and alignment) stop by the counting house before entering the hall when in Controlled Access. Furthermore, to confirm that these workers have communicated with the Run Coordinator and the Hall Work Coordinator.

- 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.

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.

4.5 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. Any special conditions which apply to this experiment can be found in the appendix.

Target Operators are individuals who have received training from the Target Coordinator. The Target Coordinator is a rotating position. Only the following individuals in the collaboration are qualified: Paul McKee, Donald Crabb, Donal Day, Greg Smith, Frank Wesselmann, and Hongguo Zhu, other will be indicated as they become qualified.

5 Operating Procedures

5.1 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.

5.1.1 Operating Shifts

During operating shifts, 24 hour occupation of the counting house area will be maintained by crews of at least two persons[4] 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 Web site. The Run Coordinator may also designate and supervise other teams for duties such as offline analysis.

5.1.2 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.

5.1.3 Operations Turnover

The electronic log book, accessible from the Web, is a very effective means of remotely obtaining information about experimental operations. This allows

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

experimenters to log in remotely and view all log book entries prior to commencing their shift. Information which can only be recorded in the paper log book, should be noted accordingly and communicated between incoming and outgoing shift personnel directly.

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.

5.1.4 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.

5.1.5 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.

5.2 Hall Access

Access to the Hall will be governed by the JLAB Beam Containment Policy[5], 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.[6] 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 make a request to MCC that the Hall be brought to Restricted Access. Such a request requires prior approval from the Run Coordinator and the Physics Division Liaison, while the actual transition will be supervised by the Hall Work Coordinator.

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

[6] 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.

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.

5.3 Collaboration Request for Laboratory Resources

The collaboration may request additional services from accelerator division through their Accelerator Division Liaison, Hari Areti. The collaboration may also request additional services from hall personnel through Physics Division Liason, Mark Jones.

These requests should be noted in the logbook. Some requests may require that an SOP, OSP, or TOSP be developed.

Major, abnormal, or unanticipated configuration modifications such as stacking or movement of significant shielding, unanticipated vacuum work, unanticipated beam line modifications, the replacement of a wire chamber, etc., require approval of the Hall C Leader, Rolf Ent[7], and the use of appropriate personnel. The Hall Leader may require that a SOP, OSP, or TOSP be prepared.

5.4 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

[7]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.

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. The Hall Work Coordinator's job is to coordinate activities in the hall so that work can take place smoothly and safely and to insure that multiple activities do not interfere.

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 work in the hall, the Hall Access state required (Controlled or Restricted), appropriate work control documents, and educational or other safety measures (such as escorts) that are needed.

5.5 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 on the normal response to alarms and equipment malfunctions. Supplementary information specific to experiment E-01-006 may be found in the ESAD.

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.

5.5.1 Equipment and Piping Labeling

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.

5.6 Independent Verification

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.

The basic check list given in Table 1 will be performed once a shift during operating shifts and once a day during standby shifts. Additional items may be added to the list at the discretion of the Run Coordinator, but the minimum information recorded will be as given in Table 1.

5.7 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.

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. Checklist performed using Hall C-specific forms should also be scanned into the computer logbook when completed. 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.)

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 program. Finally, the computer log book is the place of record for all safety issues and notification of new or updated documentation and procedures.

Table 1: Items to be Included in Shift Check List

DATE and TIME
Shift Checklist Recorder
HMS Magnet Currents
HMS Magnet Fields
HMS Cryo Fill Levels
HMS Drift Chamber Gas (gas shed)
HMS Drift Chamber HV
Current HMS Hodoscope HV
HMS Pb-Glass HV
HMS Cerenkov HV
HMS Cerenkov Gas/Pressure
Polarized Target Superconducting Magnet Helium Level
Polarized Target Superconducting Magnet Nitrogen Level
Polarized Target Buffer Dewar Helium Level
Polarized Target Nose Helium Level
Polarized Target Magnet Temperature R8
Polarized Target Magnet Status Persistent or Driven
Polarized Target Magnet Field Current
Polarized Target Magnet Current in Leads
Polarized Target Magnet Shim Heater Status
Polarized Target Helium Separator Flow
Polarized Target Helium Main Flow
Polarized Target Helium Boil Off Flow
Polarized Target OVC Vacuum
HMS Vacuum
CODA STATUS
HMS ANGLE
TARGET POSITION
Beam Energy
Beam Current
Beam Duty Factor
Beam Rastering (Fast and Slow)
Special Beam Conditions
TV Camera visual survey of Hall
Visual Survey of Electronics in Counting room

A E-01-006 Collaboration List

D. Crabb, D. Day, R. Lindgren, P. McKee, D. McNulty, B. Norum,
Y. Prok, O. A. Rondon (spokesman), B. Sawatzky, C. Smith, K. Wang,
F. Wesselmann, M. Zeier, H. Zhu
Institute of Nuclear and Particle Physics
Department of Physics, University of Virginia
Charlottesville, VA 22901

F. Bloch, C. Carasco, J. Jourdan, K. Normand,
D. Rohe, I. Sick, M. Steinacher, G. Testa, G.Warren, H. Woehrle
Departement für Physik und Astronomie der Universität Basel
CH-4056, Basel, Schweiz

R. Carlini, J. P. Chen, R. Ent, H. Fenker, K. Garrow, J. Gomez,
M. Jones, D. Mack, I. Niculescu, G. Smith, W. Vulcan, S. Wood, C. Yan
Thomas Jefferson National Accelerator Facilty
Newport News, VA 23606

W. Boeglin, L. Coman, L. Kramer, P. Markowitz, B. Raue, J. Reinhold
Department of Physics, Florida International University
Miami, FL 33199

B. Hu, E. Christy, L. Cole, A. Gasparian, Y. Liang
C. Keppel, L. Tang, L. Yuan
Department of Physics, Hampton University
Hampton, VA 23668

M. Katramatou, G. Petratos
Kent State University
Kent, OH 44444

N. Savvinov
Department of Physics, University of Maryland
College Park, MD 20742

P. Bosted
University of Massachusets at Amherst
Amherst, MA 01000

J. Dunne, J. Cha
Department of Physics, Mississippi State University
Mississippi State, MS 39762

M. Khandaker
Department of Physics, Norfolk State University
Norfolk, VA 23504

A. Ahmidouch, S. Danagoulian
Department of Physics, North Carolina A & T State University
Greensboro, NC 27411

A. Klein
Department of Physics, Old Dominion University
Norfolk, VA 23529

M. Elaasar
Southern University at New Orleans
New Orleans, LA 70126

J. Lichtenstadt
Tel Aviv University
Tel Aviv, Israel

J. Yun
Virginia Polytechnic Institue and State University
Blacksburg, VA 24061

T. Averett
College of William & Mary
Williamsburg, VA 22222

A. Agalaryan, R. Asaturyan, H. Mkrtchyan, S. Stepanyan
Yerevan Physics Institute
Yerevan, Armenia

B Special Procedures for Hall C

B.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" or lesser state the maglock will release after a valid badge is scanned by the badge reader. Each individual must scan his/her badge separately and all entries and exits are logged. 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.

B.2 Pivot Area Access

The pivot area and access to it is restricted 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 kept to those with critical skills with a real need to access the pivot area. The access name list "gate keeper" is Paul Brindza (Hall C Engineer). All access to and work on the pivot area must be performed in accordance with the pivot area work OSP.

C Special Procedures for E-01-006

Hall C Experiment E-01-006 is a major experiment requiring components and apparatus that are not part of Hall C's standard equipment. These include a polarized ammonia NH_3 and deuterated ammonia ND_3 target. The target operations are under computer control in the counting house. The equipment and safety issues specific to E-01-006 are documented in the E-01-006 Experimental Safety Assessment Document.

E-01-006 also requires modification to the beamline. E-01-006 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.

C.1 Transition to Restricted Access

E-01-006 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 50 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 and a written checklist will be provided for use by the Run Coordinator. These requirements do not apply in the case of 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.

- In addition the Run Coordinator must arrange that the target field is deenergized and arrange that the magnet leads are removed from the supply. The Hall C Work Coordinator will lock the leads 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 windows 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 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. The Run Coordinator or the Shift Leader requests that the Target Coordinator or his designee ramp the target field down. Once the field is down, 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. The Target Operator must disconnect the magnet leads at the magnet supply. 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.