RESPONSIBILITIES OF EXPERIMENTERS AT NSCL

Manager for User Relations

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This document describes the responsibilities of experimenters at NSCL as well as NSCL procedures and documentation relevant to experimenters during the life cycle of an experiment. This document will be sent by e-mail to the Spokesperson of the experiment two weeks prior to the start of the experiment. It is the Spokesperson's responsibility to make sure that all members of the experimental team who may be in charge of a shift are aware of this document's contents. While the document, including the Appendices, is required reading, the contents of the links (with one exception) are recommended but not required. The contents of the link groups.nscl.msu.edu/s800/vault/S3guidelines.pdf are required reading for S3 vault experimenters. Additional details are posted at www.nscl.msu.edu/exp.

We require that:

(a) the Spokesperson of the experiment, prior to the start of the beam time, signs a form acknowledging that he/she has read this document and made sure that all members of the experimental team who may be in charge of a shift are aware of the document's contents and that the team will comply with all operating and safety policies of both MSU and NSCL; and

(b) the Spokesperson or designee will return at the end of the experiment a checklist of tasks the experimental group is responsible for performing. The form and the checklist are available from the Manager for User Relations. In-house Spokespersons should sign the form any time prior to the start of the beam time, and outside Spokespersons should sign it upon arrival at NSCL.

Please note: The NSCL complies with University and US Federal export control regulations. Results of experiments at NSCL are expected to be published in peer reviewed journals. If any aspect of your experiment is restricted, involves confidentiality agreements or is classified, please contact the Manager for User Relations to determine if export control regulations might apply. The Manager for User Relations must be informed if you intend to ship to the lab or bring export controlled items, software, or technical data subject to export control, prior to bringing these items to NSCL/FRIB. Export controlled software or technical data must not be stored on cloud sites. Visitors are prohibited from giving tours of the radiation-restricted areas within NSCL/FRIB.

Please contact the Business Support Organization Export Control Manager (export@frib.msu.edu, 517-908-7336) for questions regarding compliance and the Manager for User Relations (useroffice@nscl.msu.edu, 517-908-7219) for questions regarding your responsibilities under the NSCL/FRIB Export Control Policy.

A. Prior to Start of Experiment

1. After an experiment has been granted beam time by the NSCL Director, it typically takes 6 months or longer before the experiment can be run. The timeline for the scheduling process is described at *www.nscl.msu.edu/exp/prepexp/timeline*.

2. All communications from NSCL regarding the experiment will be sent to the Spokesperson for dissemination to the collaborators as he/she sees fit.

3. Once the itinerary of outside users coming to participate in the experiment is known, the Spokesperson of the experiment should notify the Manager for User Relations of the names and itineraries of the outside users, so that arrangements can be made prior to arrival. Requests to help arrange accommodation, if desired, should be made at this time.

4. The NSCL Safety Office **must** be notified 2 weeks in advance if you intend to transport any radioactive materials to or from NSCL. Please submit the form "Request to Ship Radioactive Materials To/From NSCL" posted at www.nscl.msu.edu/exp/prepexp/transport. This will allow our safety group to make the necessary arrangements.

5. A user planning a longer-term (> 1 month) visit and needing a personal NSCL computing account should inform the Manager for User Relations or a collaborating NSCL faculty member. Such account requests will be reviewed, and if approved, will have a maximum lifetime of 60 days. If a longer period is necessary, a written request from a NSCL department head is required. (See items 8, 11, and 12 below for information on the computer account for the experiment.)

6. NSCL relies on the cooperation of its users to conduct their activities in a manner that conforms to the environment, safety, health, and security requirements of NSCL and MSU. NSCL will provide safety training of users to this end. All NSCL users are required to have a site-specific radiation safety training, with an annual refresher, prior to working in the experimental vaults. The training is given on-line, per the following procedure:

- The Spokesperson should send the Manager for User Relations the names and e-mail addresses of the members of the experimental team who need the training or refresher;
- An ANGEL account will be created for each person by the NSCL Safety Office and an e-mail message will be sent to the individual giving Log-in name and password;
- Log into http://angel.msu.edu
- In the “Log-in box” at the top left, select “ANGEL Guest Account”
- In the screen that opens, type in the Log-in name and password sent in the e-mail
- Click on “Safety Training for Non-NSCL/FRIB Personnel”
- In the screen that opens, click on the “Safety Training” box in the top row, and select “Safety Training for Non-NSCL/FRIB Personnel.” Become knowledgeable about the content of the training module (this will take about 90 minutes).
- Take the “Radiation Safety Quiz.” Successfully taking the Quiz completes the requirements.

It will be most convenient for the user to take the training prior to arrival at NSCL, but the option to take the training after arrival is available.

7. S3 vault experimenters should read the guidelines posted at:
groups.nscl.msu.edu/s800/vault/S3guidelines.pdf

8. An experimental account will be created for you in advance of your experiment's starting date. This happens automatically 2-4 weeks before your scheduled beam time, but it can be created earlier upon request to the Manager for User Relations (useroffice@nscl.msu.edu). Assigned disk spaces include:

a. Experimental Area
   i. the experiment's home directory (/user/expnum), written to tape at the end of the experiment.
   ii. a temporary data spooling area (/events/expnum) will be created to hold your experiment's data during the run, and is written to tape at the end of the experiment.
   iii. if desired and upon request to the Manager for User Relations , an additional temporary spooling area (/mnt/daqtesting/expnum) can be allocated for detector testing and development data. It is never backed up.

b. Analysis Area (Only accessible by NSCL Collaborators on the experiment)
   i. a 'project' directory (/mnt/projects/expnum) for storing files associated with your analysis, configuration information, etc. This file space persists even after the home directory is removed, and is fully backed up.
   ii. /mnt/rawdata/expnum, which will hold a copy of the raw experimental data, and is automatically populated from /events/expnum at intervals during the experiment. It is read-only, and once the experiment is closed out it will be identical to what is on your data tape (i.e. it also holds a copy of /user/expnum).
   iii. /mnt/analysis/expnum: scratch area for analysis activities. You can, for example, store derived data files (root files, filter files) here. This area is never backed up.

B. Upon Arrival at NSCL for Experiment

9. Details of arrival procedures and miscellaneous useful information are posted at www.nscl.msu.edu/exp/performingexp/upon-arrival. For entry into NSCL when you first arrive, please go to the main (west) entrance of the building (closest to Chemistry). If you arrive during normal business hours, the doors will be open. If after hours, please use the phone located between the outer and inner doors to call the Operator at 305; and, if (s)he is not at that number, page him/her by dialing 143. Or you can use your cell phone to call the Cyclotron Console at (517)908-7305.

10. Members of your group will need NSCL access cards to enter NSCL and work in radiation-restricted areas of the laboratory. Our guiding principle is that users receive building access soon after they arrive with cards that expire when they leave. Access cards to radiation-

restricted areas are granted only to users with valid user training (see item 6 above). The Manager for User Relations is your contact for getting your access card. If a user who needs training arrives after hours or on the weekend and has a business need to access NSCL prior to resumption of business hours, (s)he will be issued a temporary restricted access card (programmed for perimeter door access to non-restricted areas) that expires 8 hrs after resumption of normal business hours; if such a user needs to enter restricted areas prior to obtaining user training, (s)he must be escorted in those areas; after the user has received the required training, the card will be re-programmed for radiation-restricted area access. Your access card will be personalized with your picture (head shot). If you send us such a picture (e.g. in .jpg format) prior to arrival, we will use it; otherwise, the Human Resources Administrator, in Room W232, will take your picture after you arrive. Your access card will be saved by NSCL for future visits. Please turn it in to the Manager for User Relations at the completion of your visit.

11. When you arrive at NSCL, you can obtain NSCL parking permits, personal dosimeters for the members of your group, and computer account information for your experiment from the Manager for User Relations. The computer account procedures are posted at www.nscl.msu.edu/exp/performingexp/resources - computeraccount. Note that users may not install their own software on any of NSCL computers; but they can request NSCL staff to do so. Such requests will be reviewed and, if approved, will be implemented. Note also that the computers may be re-imaged, removing such extra software, without notification in the interval between experiments.

12. To maintain the integrity of the NSCL computing network, desktop and portable computers not managed by the NSCL Computer Department may not connect to any Ethernet wall jack within NSCL. Users may connect their portable computers to switches labeled “PUBLICNET” in the Data-U’s or to the MSU campus-wide wireless system that is available throughout NSCL.

13. Before the start of the beam time, experimenters must be aware of (a) the role of the **Operator in Charge**, (b) the role of the **Experimenter in Charge**, and (c) the procedures for handing over control of the beam. These three procedures are described at www.nscl.msu.edu/exp/performingexp/guidelines#operation and are also appended at the end of this document.

In particular:

a) It is the experimenters’ responsibility to inform the **Operator in Charge** whether their experiment is running or not running. “Experiment running” indicates time when data are being taken or an activity in support of taking data that was identified in the proposal is being performed. The times that the "Experiment is running" and "Experiment is not running" count towards the allocated time. Reporting the times accurately helps us give better guidance to users in future calls for proposals.

b) It is the experimenter’s responsibility to inform the **Operator in Charge** of any technical concern requiring immediate action. The **Operator in Charge** will call in support to fix the problem. Issues that do not require immediate action should be communicated to the **Beam Coordinator** or the Manager for User Relations for follow-up action.

Monitors in the Control Room and in the Data-U's display the current status of cyclotron operations, and the names of the Operations staff personnel on shift. Along with other information, you will find the name and photograph of the **Operator in Charge** and the **Beam Physicist on Call** for the current shift.

Please be aware that the **Experimenter in Charge** may be called upon at any time to make critical decisions that can affect the whole experiment. Thus it is highly desirable for the Spokesperson of the experiment to carefully select those individuals that will be the **Experimenter in Charge** during the course of the experiment and to establish a communications protocol with the **Experimenter in Charge**. The **Experimenter in Charge** will act in the absence of the Spokesperson.

14. The Spokespersons assume line management responsibility for safety in their groups. Spokespersons will assign one or more members of their group as Safety Representatives. The safety responsibilities of the Spokesperson and of the Safety Representatives are described at http://www.nscl.msu.edu/exp/safety/users .

C. During Experiment

15. Two brief coordination meetings are held every work day at NSCL, a general meeting at 8 AM in the Lecture Hall (room 1201) and a beam coordination meeting at 1:45 PM in the Atrium. Starting two days prior to the experiment and during the experiment, the Spokesperson of the experiment or a designee should participate daily in both meetings. If the Spokesperson is not available before the experiment, the Spokesperson informs the Manager of User Relations of a designee. During running time, the **Experimenter in Charge** attends both meetings.

16. Cyclotron Operators are instructed that no one is allowed to perform potentially hazardous work while alone. On rare occasions during repairs to restore running conditions, experimenters may be requested to act as a Safety Watch during off hours. If an experimenter is unwilling or unable to act as a Safety Watch, the work will be postponed until additional staff becomes available. If an experimenter is working alone and needs to perform potentially hazardous work, he/she must contact the **Operator in Charge** before starting work.

17. Primary beam intensities quoted in the NSCL Primary Beam List (http://www.nscl.msu.edu/exp/propexp/beamlist) are based on experience from operation of the Coupled Cyclotron Facility. Typically, cyclotrons will be tuned to achieve a beam intensity above the beam list value as the intensity might decrease over time. Cyclotrons will be retuned at experimenter's request or whenever it is necessary for the safe and efficient operation of the Coupled Cyclotron Facility. The total time scheduled for the experiment includes time for primary beam retuning based on operational experience. Intensity limits have been established for all beams in order to protect equipment from damage.

D. After Experiment

18. Upon completion of the experiment (including taking calibration data), the experimenters will immediately confirm in writing that the experiment has ended by completing the "checklist for NSCL experimenters" form and giving it to the Manager for User Relations.
    a. The Spokesperson signs the form, and puts it in the mailbox of the Manager for User Relations or scans and email to useroffice@nscl.msu.edu.
    b. The experimenters will indicate on the checklist if they need more than one copy of the raw data and home directory on LTO tape.
19. Storage
    a. Within three business days after receiving the form, the Computer Department will combine the experimental home directory (/user/expnum) with the /events/expnum file into the /mnt/rawdata/expnum area, then create and validate two sets of LTO data tapes (or more, if requested by the experimenters) with these data.
    b. The experimenter's copy will be handed to the Manager for User Relations for distribution to the experimenter. The other copy is placed in the NSF Storage Inventory. After two years, the Computer Department will remove the tape(s) from the NSF storage inventory and offers them to the Manager for User Relations for distribution to the spokesperson. If the tapes are not required by the spokesperson, they will be reused or destroyed.
    c. Seven days after submission of the "checklist for NSCL experimenters" form, the experimental account and all temporary disk spaces will be removed (/user/expnum, /events/expnum, /mnt/daqtesting/expnum)

In addition, the machine 'tapehost.nscl.msu.edu' in data-U 2 is available for experimenters to read, write, and validate LTO tapes.

20. All users are reminded to properly survey all equipment being removed from the experimental vaults, especially equipment that was directly exposed to primary or secondary beam particles.

21. Please make sure that the experimental vault and the Data-U are left in a tidy state (the presumed pre-experiment condition). S3 vault experimenters should follow the guidelines referred to in item 7 above. Outside users should allow enough time to tidy up the experimental vault before they leave; they are also responsible for removing all experimental apparatus and materials they bring in. Outside users can store limited amounts of material at NSCL in storage boxes. An outside user group wishing to store something should inform the Manager for User Relations and then take the material to our receiving department, have them put it in a storage box, and record the number for the box. The receiving department has a database of stored boxes. Thus it will be easy to locate and retrieve the box when the item is needed again.

22. If items were checked out of e-pool for the experiment, please return them to their original locations in the e-pool room and also check them back in.

23. Your feedback at the end of the experiment will help us make NSCL a more supportive place to do research. To this end, within two weeks of the end of your beam time, please fill and submit the feedback form posted at groups.nscl.msu.edu/survey/index.php?ID=13.

24. We would appreciate your notifying the Manager for User Relations when a paper is submitted for publication or an advanced degree (Ph.D. or Masters) is awarded to a student, in cases where the paper or degree is based in part or whole on experimental work at NSCL.

We wish you the best of luck on your experiment!

APPENDIX 1: ROLE OF THE OPERATOR IN CHARGE

The Operator in Charge has the authority and responsibility to safely and efficiently operate the Coupled Cyclotron Facility. Decisions of the Operator prevail. Users can request review of Operator decisions through the Manager for User Relations.

1. The name and a photograph of the Operator in Charge are displayed on the data-U status monitors. Experimenters can visit or call (x 305) the Operator in the control room or page the Operator (x 143) if needed. The Operator has one of two 2-way radios with him when performing duties outside the control room (the other radio is charging). These radios can be contacted by dialing 9-2-8090, waiting for the tone, then dialing either 750019 or 750020.
2. In the event of facility equipment breakdown the Operator in Charge performs an initial assessment and coordinates the response. The Operator also routes requests from experimenters for after-hours laboratory resources to appropriate lab personnel.
3. Experimenters are not allowed to change beam attenuator settings without approval from the Operator in Charge. This approval may be granted to individual experimenters for the duration of their shift. Changing to the wrong beam attenuator can cause severe damage to the cyclotrons and to experimental equipment.
4. The Operator has the authority to take control of the beam at any time if this is required for the safe and efficient operation of the Coupled Cyclotron Facility.
5. The Operator in Charge needs to know the status of the beam at all times.
    a. The Operator releases beam to the experiment by stopping the beam on a beam blocker and informing the experimenter that beam of a specified intensity is available for the experiment on a specified beam blocker. The Operator hands the beam control key to the Experimenter in Charge. The experimenter can then remove the beam blocker with the beam control key.
    b. The experimenter relinquishes the beam by inserting the same beam blocker and returning the key to the Operator, who then assumes control of the beam.
6. Operators change shifts at 7 am, 3 pm, and 11 pm. During these times Operators are busy with shift-change duties. Operators will visit the experiment towards the beginning of their shift as their duties permit.
7. Operators need to take control of the beam every few hours to measure and record machine parameters and to tune up the beam. While this can often be done efficiently if experimenters make the Operator aware of any time periods where the beam is not used for the experiment, the Operator in Charge must take control of the beam and tune up whenever beam losses increase significantly.
8. The Operator in Charge keeps the experimenters aware of the cyclotron status.

APPENDIX 2: ROLE OF THE EXPERIMENTER IN CHARGE

1. An Experimenter in Charge must be identified by the Spokesperson during the period the experiment number is displayed in the data-U as current experiment. This includes the time needed to tune the beams for the experiment.
2. The Experimenter in Charge must be able to answer questions about the experiment and its status on behalf of the Spokesperson.
3. The Experimenter in Charge must keep the Operator aware of the experiment status (running or not running), breakdowns of or problems with facility hardware and functions, and vault entries.
4. The Experimenter in Charge receives beam from and hands beam to the Beam Physicist or Operator in Charge via the red User Lockout Beam Blocker button following the procedure described in Appendix 3.
5. The name of the Experimenter in Charge is displayed on the data-U status monitors. Experimenters can change the name of the Experimenter in Charge by asking the Operator (x 305) to change it at any time.
6. We suggest that the Experimenter in Charge visit the control room towards the beginning of an experimental shift.
7. Prior to entering the experimental vault the appropriate beam blocker and wall plugs must be inserted (in this order) for radiation protection. The experimenters can request that the Operator insert them. After securing the vault, the wall plug can be retracted, then the beam blocker, so that the wall plug never gets irradiated. If experimenters anticipate spending more than a few minutes in the vault, the beam should be relinquished so that the Operator can use the time to measure beam parameters.

APPENDIX 3: HANDING OVER BEAM BETWEEN OPERATORS, BEAM PHYSICISTS, AND EXPERIMENTERS

Control over the beam is handed to and from the experimenter with the beam blocker in image 3 of the A1900 inserted. Experimenters can control this beam blocker with the red User Lockout Beam Blocker insert and the green User Lockout Beam Blocker retract buttons in each Data-U.

a) Handing beam from the operator or beam physicist to the experimenter

1. Operator in Charge or Beam Physicist verify that the User Lockout Beam Blocker is inserted and put beam on the User Lockout Beam Blocker.
2. Operator in Charge or Beam Physicist inform Experimenter in Charge that beam is available on the User Lockout Beam Blocker with a primary beam attenuation of xxxxx. Operator in Charge or Beam Physicist hands beam key to Experimenter in Charge.
3. Experimenter in Charge inserts beam key into the Beam Blocker key lock and turns beam key to 'enable' position, verifies the attenuation on the display in the Data-U, and retracts User Lockout Beam Blocker when appropriate.

b) Handing beam from the experimenter to the operator or beam physicist

1. Experimenter inserts User Lockout Beam Blocker.
2. Experimenter inserts wall plug and viewer to protect experimental setup if beam key is handed back to Operator or Beam Physicist.
3. Experimenter in Charge informs Operator in Charge or Beam Physicist that the beam has been relinquished and hands beam key to Operator or Beam Physicist.

Note: The Operator in Charge and the Beam Physicists only relinquish beam to the Experimenter in Charge, whose name appears on the Data-U display. The location of the inserted beam key is shown on the Data-U displays. The time to hand-over the beam key should be kept short.