Comments from the UITF COO review on April 24, 2019

1. Poelker slide 19, authorities: where’s the intellectual input, add “OSPs” to bullets 1 and 3.
2. Use the same terminology that Patrizia uses in ERRs, e.g., Experimental Coordinator, PI, etc., ie.. become more familiar with the ERR process before the ARR
3. We should build a Beam Authorization tool, ask for this from High Level Apps
4. Keith: describe the rapid access system from System Expert point of view, include mode detail in the UOD or reference something official from RadCon, the owner of the rapid access system
5. The waveguide pressure regulator should be protected by something so that someone can’t just go up to it and change it
6. Closed Circuit TVs should be installed in the UITF with video monitor in the control room
7. Poelker should provide a list of assumptions that were used in shielding calculations, for example, max current that can be delivered, the amount of loss that could lead to noticeable vacuum increase, state clearly we assume point losses and not loss distributed throughout
8. Why not create a table showing radiation from 1% beam loss instead of 0.1%. 1% loss is more credible and it seems we still have adequate shielding for 1% loss.
9. Vashek’s presentation should be revisited with Keith and others. Eliminate some slides, state assumptions, then simply show the tables and remove the simulations slides which few actually appreciate.
10. Matt write the commissioning plan

For Vashek’s presentation:

* Put the rad tables up front
* List assumptions: “imagined maximum loss” before detection and correction, or beamline venting: 1% point loss, i.e., 1uA
* Is there a vacuum measurement we can point to that shows pressure rise when 1uA is steered into pipe?
* List the hardware limitations: GUN HV power supply max current, the klystron power and Qo values
* Discuss current limit and how it is vital part of OSP and procedure to run beam.
* Ask software to provide something related to current limit? Part of MPS masking?
* Describe the procedure to setup beam, minimize loss. Ie..write the commissioning plan

**UITF COO Review**

Stephen Benson, April 30, 2019

A review of the UITF Conduct Of Operations (COO) was held on April 27. A description of the operational procedures and approaches, a description of the personnel safety system, and an analysis of the projected radiation doses around the accelerator were covered in the review. This document is my impression and conclusions of the review. The comments and suggestions are given in the spirit of improving the presentation of these ideas for an Accelerator Readiness Review (ARR) and improving the documentation for the facility:

First of all, it is important to note that the UITF builds on the procedures and policies of CEBAF that have been developed and improved over the years. This must be stressed in any ARR. The ARR can then concentrate on the differences between the UITF approach and the CEBAF approach. It is very important to not re-invent the wheel here.

**FSAD -** The latest version of the FSAD already incorporates the UITF and the only thing to point out is that it assumes the use of a BCM credited control to limit the current in Cave 2. This is no longer required. If the document can be updated before the ARR it would greatly cut down on confusion. The (minor) differences between CEBAF and the LERF and the UITF are:

* The operations requirements, staffing levels, training and Credited Control Certification Logs are included in the OSP for the UITF rather than in the UOD or some other document.
* The hazard from ceiling penetrations is different due to their placement over the beamline. This seems to have been adequately addressed by shadow shielding, something to stress.
* The cryounit uses liquid nitrogen to cool the shield. This was also compensated for in the ODH design and is covered in the ODH assessment.

**ASE -** The current version of the Accelerator Safety Envelope is very similar to those for CEBAF and the LERF. The UITF does have at least one barrier (the grate preventing access to the ODH penetration) that is not interlocked to the PSS and must be confirmed before beam authorization. The ceiling blocks over the HDICE target are removable and there is an OSP for how to safely remove them. The ODH monitors are a newer type of monitor but otherwise the ODH system is essentially the same as those in the rest of the lab. Due to the use of nitrogen, both high and low monitoring is necessary.

**UOD –** The UITF Operations Directive is a simplified version of the AOD or LOD for CEBAF and the LERF. A few issues:

* Both the LOD and the UOD refer to section 3130 of the ES&H manual. This section is being updated. One important question is whether this will happen before the ARR. If it has not yet been updated it must be stressed that the process is being reviewed and will be similar but perhaps a bit simpler than the procedures in section 3120. It might even be worth updating the UOD to be explicit about the need to use section 3130 to review programs that are either outside user experiments or Accelerator Division experiments.
* There is no mention of Beam Authorization after a shutdown or facility modification. Who authorizes that the facility is ready for beam operations? What procedure does he or she use to decide this?
* Does the UITF Facility Manager have a deputy who can make decisions when the Facility is not available?
* The Rapid Access System is described as having an audible alarm. Is this present even during beam operations or does it merely function when in an OPEN state?

**OSPs –** The OSPs currently available are quite comprehensive and well written. There are a few typos here and there but the procedures are well laid out and complete. Note that there is no OSP currently posted for MeV operation. It should be similar to the keV OSP, which is quite complete, but it would be useful to review this a few weeks before any ARR since it is such a critical document. Please issue a draft ASAP.

**COO Review –** Some general notes:

* Most operational aspects mirror CEBAF, e.g. there is a UOD, a UED, a UITFLog, and a UITFList. The control system is very similar to CEBAF whenever possible. This is good and should make technicians feel at home with the procedures.
* It is not clear if there will be a hot checkout procedure similar to CEBAF or the LERF but I think, since the UED will be there, it will cut down on mistakes and make operations smoother and so is strongly advised to have it.
* One point of contention was the approval process for tests of accelerator hardware. It should be pointed out that we are updating the FEL procedures (ES&H Manual Chapter 3130) to be applicable for small experiments and projects and this framework will be used for small projects on the UITF as well. For *very* small projects one can use the UITFList as the review process. As the projects get larger one has to add OSPs and their review and eventually formal RSADs and ESADs. This should be spelled out in the new EH&S Section 3130.
* Another thing pointed out is that there is currently no formal beam authorization procedure. Such a procedure and the Beam Authorization Tool are quite useful in making sure that everything is taken care of before beam operations commence. In keeping with the first point above, this would be a very good idea. It helps ensure that we do not get in a situation where an ASE violation is possible.
* An important distinction in UITF operations is the much smaller staffing needs. Only one person is required to sweep, run the accelerator or shut things down. Make sure that the implications of this have been thoroughly studied and that no additional hazards have been created by this.
* The radiation assessment was a little confusing and the results were only included in the extra slide. I would suggest putting the results right up front and then show how they are justified. You probably should consider a 1 microamp loss rate for the high current beam as well just to make sure you can answer questions about it. It is also not clear that you need to provide the initial back-of-the-envelope dose calculations when you have Monte Carlo results. It might be better just to present the MC results by themselves. Note that these are all presentation issues. The data itself looks pretty good.
* A bit of a nit to pick is to make sure that the terms used to describe the experimental approval process use the same nomenclature as the physics procedures as spelled out in the ES&H manual. This cuts down on confusion and makes the process easier to review.
* The PSS review was quite nice. I would stress that the system was developed from the GTS design, which has worked very nicely, and that the design philosophy and architecture are very similar to the CEBAF system. The additions to the system from other systems like the light barrier interlocks backing up the door interlocks, and the ability of a single person to sweep the vault, should also be highlighted. All this could be summarized in one of the first slides, before getting into the details.

**UITF COO Review**

Michael Aiken, May 3, 2019

Below are my notes and questions from the Conduct of Operations review for the UITF as well as the provided documentation. This review serves as a preparation for the Accelerator Readiness Review. Some of the questions listed might not need official documentation in the ASE, FSAD, or UOD, but are items that might come up during the readiness review. My expertise and input comes from how we operate the CEBAF machine. Many of the systems in place at UITF mimic CEBAF, but UITF is a much smaller scale accelerator, and therefore the UITF might not need all of the items I highlight.

FSAD Notes:

4.4.2.1 - How do you limit current? Even with a current monitor in place, what is your system for setting a limit, who has editing privileges to adjust the limit, and what is the authorization process. Will software prohibit current above a set threshold? Or is it strictly administrative?

4.4.1.1 - “However, the UITF can also serve as a gun test stand, with no RF acceleration and with beam terminated in water cooled faraday cups upstream of the ¼ cryomodule” --- Devices need to be locked in or High Voltage locked off. Where are the locked devices documented, and who manages the locks for these devices?

ASE Notes:

Section 2: How often do you check credited controls? Will there be a radcon checklist before each run period to make sure credited controls haven’t been modified? Will you utilize a System Status Tool where equipment can be set to ready or not ready?

Section 3: How do you post the beam authorization? When will beam authorization expire? Does this check the credited controls status? or does it talk to the system readiness tool.

Other notes: A number of references are made to the OSP defining certain requirements, such as staffing. Do you have this drafted up yet? Should the bare minimum staffing requirements be listed in the FSAD?

UOD Notes:

1.1.1.2 - Utilize a binder to contain experiment ESAD/RSAD/COO/ERR with a signature page to keep track of signatures for current experiment.

1.1.1.3 - Outside-funded experiment proposals need a review process

1.2.1 - Post a list of qualified operators

1.3.3 - Typo? UITF Facilities Director. Should be UITF Facilities Manager?

3.3.1 - Software will be in place to ensure the Safety Envelope isn’t violated?

3.3.2 - Add the DSO to the notification list for operational restriction violations

Table 3 – In scenario 3 (Beam off & and PSS in Run state) Minimum Required Staffing should be qualified operator on site? Or do you allow PSS state to be in run state with nobody at the lab?

4.2.5 - Need a database for Bypassed System Interlocks. The accelerator uses ABIL. This should be required reading for operators before delivering beam.

Other notes: What is the training protocol for operator qualification. Is this called out in the OSP? Operator SRL’s need to reflect the qualification guidelines.

Review Notes:

Based on the possible dose rates at the penetrations and ODH vents you’ll need to sweep the rack area upstairs and put radiation boundary rope up at the entrance “door” before starting beam operation. Does this need to be done by a person with radiation training qualifications greater than RAD Worker I, because it is establishing a boundary?

Radiation beam loss calculations were based off equivalent 8uA steady tune beam loss at CEBAF? It was unclear how you came up with the expected beam loss amounts. It would be helpful to explain your expected beam loss amounts, and introduce the systems you’ll use to monitor beam loss (just BLMs?) and how they will be calibrated to ensure low levels of sustained beam loss.

Closing:

The format and sequence of the presentations / walk through was good, and answered many of my questions I had going into the meeting. I think you have a good base going into the review, and mostly just need to tidy up some of the specifics. Emphasis on piggybacking of already established protocols and tools for CEBAF, LERF, and Experimental Hall operations will give you a good foundation for your review, and you chose a good mix of reviewers with knowledge of these areas.

Links to tools that I mention in the review, that we use at CEBAF:

ABIL: <http://opsweb.acc.jlab.org/abil/pro/>

Beam Authorization: <https://accweb.acc.jlab.org/beam-auth/>

Operational Restrictions: <http://opsweb.acc.jlab.org/internal/ops/ops_webpage/restrictions/ops_restrictions.html>

System Status Tool (Hot Check Out): <https://accweb.acc.jlab.org/hco/readiness?categoryId=&systemId=&regionId=&groupId=&qualified=>