

## **Conduct of operations**

Chain of command:

LCLS-II Project lead: Joe Preble

LCLS-II CM production lead: Ed Daly

LCLS-II LERF CM Test Project Lead: Kevin Jordan

Project Engineer: Joe Gubeli

Work Coordinator: Jim Coleman

Liaisons:

Curt Hovater – for all loaner equipment from SLAC

Wes Moore – for software and cyber security between JLab & SLAC

Steve Suhring – Operability Manager, schedules the day-to-day activities that affect the CEBAF run schedule

All personnel working on the project have the authority to call for a “Stop Work”, a “Restart” would be authorized in compliance with EH&S manual section 3330, Kevin Jordan is responsible for initiation if a Notable Event investigation is required.

Kevin Jordan works together with the project engineer, Joe Gubeli, and the work coordinator, Jim Coleman to coordinate installation, removal, and cryomodule testing activities. Curt Hovater is the liaison for all loaner equipment from SLAC, Wesley Moore is the liaison for software and cyber security between JLab & SLAC. Curt Hovater, as SLAC liaison for ‘borrowed’ equipment, is responsible to interact with SLAC and track delivery schedule for equipment being shipped here from either SLAC or their vendors directly. He is also responsible for the return shipping of the loaned equipment back to SLAC. He will also work with David Seidman to ensure that we have all relevant details to fabricate & install the cables required for safe operation and testing of the CMs. Wesley Moore will interface with SLAC personnel to ensure the computer & network hardware and software are in compliance with DOE & JLab standards. Additionally, he will be responsible for safe & secure access for SLAC personnel to the new LERF computer systems required for cryomodule testing. This includes working with the JLAB/CEBAF IT staff in the design of the computer architecture.

Kevin maintains the high-level schedule, but Steve Suhring is responsible for day-to-day activities that affect the CEBAF run schedule. Steve sets the priority when allocating resources, particularly when it affects the CEBAF run and/or maintenance schedule. Joe Gubeli leads the design effort, interfacing with the engineering division and the lead designer Jim Henry. Jim Coleman work together with the individuals responsible for doing the installation work, vacuum, electricians, RF group... Jim & Kevin meet regularly to ‘look forward and back’ on scheduled work compared to actual accomplishments. The schedule is modified as needed and those changes are presented to Steve Suhring directly and at the Wednesday LEREF scheduling meeting.

The primary work control document is the ATLis, Jim Coleman & Kevin Jordan ensure that ATLis' are submitted in a timely fashion before any of the tasks are undertaken. This ensures sufficient time for the appropriate review of the work plan. Some of the tasks associated with the project will require (T)OSPs, these again will be written in a timely fashion to ensure proper review of detailed work plan prior to execution.

When the equipment arrives, either from SLAC or a vendor; Solid State Amps (SSAs), waveguide, Vacuum, Cryo, and Low-Level RF (LLRF) racks Neil Wilson & the installation crew are responsible for scheduling the crane (when needed) for transportation from the truck to the LERF equipment gallery and/or vault. Most of the equipment is too heavy to be transported to the second floor by elevator since the floor outside of the LERF elevator is only rated at 100 lbs/ft<sup>2</sup>. This equipment must be craned up to the receiving pad on the west side of the building. The LCLS-II cryomodules weigh 16,000 lbs and each SSA weighs 1,400 lbs.

**Points of Contact for LCLS-II CM testing**

	<b>JLab</b>	<b>SLAC</b>
Project Manager	Kevin Jordan	Joe Delong
SLAC Liaison	Curt Hovater Wes Moore	Alex Ratti
Project Engineer	Joe Gubeli	
Work Coordinator	Jim Coleman	
High Power RF	Rick Nelson Mark Wissmann	Dian Yeremian Garth Brown
Low Level RF	R. Bachimanchi George Lahti	Andy Benwell Sonya Hoobler
Controls	Wes Moore	D. Rogind
CM Controls	Omar Garza	K. Mattison M. Dunning (SW)
Cryo Integration	Robert Norton	Matt Cyterski
Vacuum	Jim Kortze	S. Saraf
Network/CCI	Wes Moore Anthony Cuffee	J. Zhou
Cryomodule production	Bob Legg John Fischer	
Cryomodule testing	Mike Drury Mike McCaughan	
Cryomodule Test Apps	Matt Bickley	Sonya Hoobler
Division Safety Officer	Harry Fanning	
EHS&Q Liaison	Paul Collins	

Bob Legg & John Fischer are responsible for Cryomodule production, there are weekly status meetings held jointly with SLAC & FermiLab personnel. It is from these updates that the actual transport and testing of the cryomodules is scheduled. This is directly reported to Kevin Jordan and Neil Wilson, of the installation crew, so that a crane can be scheduled and the proper lift plans are filed and followed. The normal cycle is anticipated to be on order of two months per pair of cryomodule testing. The SRF group (Legg) is responsible for the transportation of the cryomodules and Wilson is responsible for craning off the truck and delivering to the test location in the LERF vault. The installation crew will work with the alignment group to ensure that the two cryomodules are properly placed.

There is an Interface Control Document (IDC) that states roles and responsibilities between JLab & SLAC. This states who is responsible for what activities. In particular it defines the top-level effort for hardware, firmware, software, installation, commissioning, CM testing, and break-down including return shipping. This can be found at:

[https://wiki.jlab.org/lerf/index.php/Interface\\_Control\\_Document\\_\(IDC\)](https://wiki.jlab.org/lerf/index.php/Interface_Control_Document_(IDC))

The overall schedule will be updated in a MS Project schedule. This schedule will be updated periodically and posted to:

<https://wiki.jlab.org/lerf/index.php/Schedules>

The WIKI site will be the repository for all documents for the tear-out, installation, testing, and restoration of the LERF facility. As drawings are modified (from CMTF) and completed they will be posted to the site. When the activity dictates tool-box meetings they will be held after the 8:00AM MCC meeting. The Program Deputy will be integral to the LERF activities as well as the physics program so there is continuity for all activities on site. A weekly scheduling meeting will be held in the LERF on Wednesdays at 11:00 AM. These minutes will also be posted to the LERF WIKI.

Test plans for commissioning of the LCLS-II cryomodules will be developed using procedures from the CryoModule Test Facility (CMTF) and from SLAC. These will be modified to adapt to the installation at the LERF.

### **Managing safety issues from installation & removal**

Chapter 3210 of the EH&S manual describes the Work Planning, Control, and Authorization Process, that will be adhered to. The ATLI, OSPs, Task Hazard Analysis, and lift plans are the primary methods of ensuring that any given task has been thought out and properly planned. The Preliminary Hazard Analysis is complete, signed off. And posted at:

[https://wiki.jlab.org/lerf/index.php/E\\_H\\_S\\_and\\_Q](https://wiki.jlab.org/lerf/index.php/E_H_S_and_Q)

### **Managing safety issues from operations**

An Operational Safety Procedure has been developed by the SRF team for testing of the LCLS-II Cryomodules, this will be adapted for use in the LERF.

Major safety issues identified in PHA for operations, safety management process, development of work control documents (OSPs) to govern checkout and operation see PDF document in file.

[https://wiki.jlab.org/lerf/index.php/E\\_H\\_S\\_and\\_Q](https://wiki.jlab.org/lerf/index.php/E_H_S_and_Q)

Facilities have documented the location of the SSAs in the gallery meet related codes for egress, this is documented on the WIKI site. A new ODH assessment has been requested, that is in progress. Arc flash requirements are being addressed for the electrical panel installation (480VAC/400 Amp) for the SSAs – there are two panels, one for each 8 SSAs. OSPs will be developed for operation of and securing power to the SSAs, these will be essentially the same as the one developed for the CMTF.

Procedures for clean vacuum work have been developed for the work in the test lab, these will be modified for work in the LERF vault. The test plan for testing and commissioning of the LCLS-II cryomodules is well developed; this will also be modified for use in the LERF. This will be significantly different due to the use of SLAC hardware and all (most) software will be done in EPICS (not LabView).

### **Documenting Formal Reviews**

All reviews will be posted to the WIKI site, these include both formal and informal reviews of the planned work. The reviews can be found at:

<https://wiki.jlab.org/lerf/index.php/Reviews> Initial reviews include the SLAC presentation for the Baseline Change Request (BCR), the other reviews were a series of kick-offs with JLab groups, and a review of the waveguide layout prior to the procurement. There will be an overall design review will be held in the November time frame and a Readiness review will be held in the March time frame prior to operation of the SSAs (commissioning systems with high power) or actual testing of the cryomodules.

### **Schedule and Safety Hold Points**

An example of this is cool down & warm up where there could be an impact on the physics run schedule. CEBAF always takes priority over schedule and manpower. Steve Suhring maintains and is responsible for this schedule. All work is coordinated through standard procedures using the ATLis system, this also ensures full integration into CEBAF operations, including informing staff. This ensures all work is reviewed by EHS&Q professionals.

The document development is a combination of modifying CMTF documents to reflect the actual installation in the LERF and SLAC work control documents.

There are established procedures for operating the SLAC hardware, like the Solid State Amplifiers (SSAs) and the Low Level RF (LLRF) systems. Additionally there will be a plan to take the equipment apart and ship it back to SLAC at the completion of the project and restore the LERF to the initial state.

Additional 'new' systems include control of the cryomodule interfaces – vacuum, liquid level, cooldown instrumentation, and cryogenic valve control. The transfer line controls (JT/RT valves) are the same as will any cryomodules and control is from the JLab cryogenic group. This cooldown activity is well documented and coordinated.

The schedule for cooldowns will be coordinated by Suhring et al. The movement of the modules and/or shield blocks will be coordinated by the JLab installation crew – Neil Wilson will write the lift plan and enter the ATLIs for each time the crane is used on site.

#### **Considerations for LERF restoration**

Once the LCLS-II Cryomodule testing is complete the SSAs, and equipment racks will be repackaged in original shipping containers and returned to SLAC. It remains to be determined if there will be cryomodules and/or klystrons to repopulate the LERF

