Closeout Report

on the

Department of Energy
Review Committee Report

for the

Technical, Cost, Schedule, and
Management Review

of the

Linac Coherent
Light Source (LCLS) Project

May 13-15, 2008

U.S. Department of Energy

Office of Science

Review Committee Participants

Daniel R. Lehman, Chairperson, DOE/SC

SC1

Accelerator Physics

* Sam Krinsky, BNL
George Neil, TJNAF

SC2

Injector/Linac

* Richard Sheffield, LANL

SC3

Undulator

* Erik Johnson, BNL
Steve Marks, LBNL
Kem Robinson, LBNL

SC4

Photon Beam Handing Systems

* Dennis Mills, ANL
Mark Beno, ANL
Chi-Chang Kao, BNL

SC5

Control Systems

* David Gurd, ORNL (ret.)
Larry Hoff, BNL

SC6

Conventional Facilities

* Dixon Bogert, Fermilab
Mike Schaeffer, BNL
Steve Sawch, BNL

SC7

Cost and Schedule

* Cathy Lavelle, BNL
Angus Bampton, PNNL
Steve Tkaczyk, DOE/SC

SC8

Project Management

* Les Price, consultant
Frank Crescenzo, DOE/BHSO
Kurt Fisher, NNSA
Brenna Flaugher, Fermi

SC9

ES&H

* Arnold Clobes, LLNL

Observers

Jeff Salmon, DOE/SC
Pat Dehmer, DOE/SC
Pedro Montano, DOE/SC
Tom Brown, DOE/SC
Thomas Kiess, DOE/SC
Eric Rohlfing, DOE/SC
Hanley Lee, DOE/SSO
Hannibal Joma, DOE/SSO
Brian Huizenga, DOE/OECM

LEGEND

* Chairperson

Count: 23 (excluding observers)

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Charge Memorandum
Charge Questions

1. Are the project's cost, schedule, and technical baselines consistent with the FY 2009 LCLS Construction Project Data Sheet? Is there adequate contingency (cost and schedule) to address the risks inherent in the remaining work and is contingency being properly managed? Is the contingency supported by and consistent with an appropriate project-wide risk analysis? Is the information in the DOE PARS consistent with physical progress?
2. Are the construction field activities progressing in a manner consistent with the predicted costs and schedule? Has the renovation of laboratories and office space (Buildings 28 and 750) been integrated into the appropriate project planning and execution documents?
3. Are the designs, procurement and commissioning plans of the technical systems sufficiently mature to support the project schedule? Will preparations for LCLS experiments (i.e., first delivery of X-rays to the Near Experimental Hall), provide a smooth hand-off and transition to LCLS operations? Are preliminary plans adequate for determining operational readiness?

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Charge Memorandum
Charge Questions, *continued*

4. Are preparations for initiation of LCLS experimental science program progressing appropriately? Assess the effectiveness of LCLS progress and plans for activities such as user outreach and communications, proposal solicitation and review process, policy for access to the facility, goals for commissioning instruments, and plans to support the experiments during facility operations.
5. Are ES&H aspects being properly addressed given the project's current stage of development?
6. Is the project being managed (e.g., properly organized, adequately staffed) as needed to continue with construction and technical equipment installation and commissioning? Is there adequate interface activity between LCLS and LUSI? Is there adequate support from SLAC in all necessary areas (e.g., contracts, procurement, human resources)? Has the project responded appropriately to recommendations from prior DOE/SC reviews?

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Report Outline/ Writing Assignments

Executive Summary…..Tkaczyk
1. Introduction ……..Brown
2. Technical Systems Evaluations
   - 2.1 Accelerator Physics (Charge Question #1,3,4)……Krinsky/Subcommittee 1
     - 2.1.1 Findings
     - 2.1.2 Comments
     - 2.1.3 Recommendations
   - 2.2 Injector/Linac (CQ#1,3,4)……Sheffield/Subcommittee 2
   - 2.3 Undulator (CQ#1,3,4)…….Johnson/Subcommittee 3
   - 2.4 Photon Beam Handling Systems (CQ#1,3,4)…….Mills/Subcommittee 4
   - 2.5 Control Systems (CQ#1,3,4)…… Gurd/Subcommittee 5
   - 2.6 Transition to Operations (CQ#1,3,4) ……..Krinsky/Subcommittee 1
3. Conventional Facilities (CQ#1,2,6) ……Bogert/Subcommittee 6
4. Environment, Safety and Health (CQ#5) ……Clobes/Subcommittee 9
5. Cost and Schedule (CQ# 1,2,3,4)…….....Lavelle/Subcommittee 7
6. Project Management (CQ#1-6) ……..Price/Subcommittee 8

2.1 Accelerator Physics

Samuel Krinsky
George Neil

2.1.1 Findings

- Progress in commissioning the injector, linac and bunch compressors has been outstanding. Beam quality at the end of the linac meets the requirements for commissioning the undulator systems.

- Safety is integrated into all planning for the accelerator systems

- The MatLab based control has made it possible to write powerful applications which have greatly facilitated commissioning.

- At present there is no work toward implementing start-to-end simulations available on-line for commissioning.

2.1.1 Findings

- Optical transition radiation screens are not usable due to coherent optical transition. This is believed to be due to microbunching in the electron beam. This microbunching may result from longitudinal space charge or from coherent synchrotron radiation in bunch compressors

- The laser heater which will be installed in FY2009 should provide sufficient energy spread in the electron beam to solve this problem.

- Plans for commissioning the undulator systems and for early SASE operation at 15 Angstroms are well developed.

2.1.2 Comments

- Budget constraints have resulted in the delay of wire scanner diagnostics in linac sector 24, upstream of the second bunch compressor. It would be very desirable if they could be implemented.

- Integration of the control of old linac hardware with the new LCLS control system is of great importance and a path needs to be found to do this without introducing a delay in commissioning.

- It would be highly desirable to upgrade (improve resolution) of the old beam position monitors in the linac as soon as possible.

- The output SASE depends on a great many beam and system parameters. Developing a simulation model and placing it in correspondence with the experimental observations will be of great help in understanding the FEL system behavior.

2.1.3 Recommendation

- Begin work to implement start-to-end simulations available on-line for commissioning. (July 2008)

2.2 - Injector/Linac

Richard Sheffield

(Sam Krinsky, George Neil)

2.2.1 Findings

- *Accelerator commissioning progress and results are excellent – Well done!!*
- Current accelerator performance is acceptable for commissioning the undulator and meeting the CD4 milestone.
- The lack of accurate beam diagnostics (BPMs and wire scanners) have had a negative impact on commissioning and this impact is expected to continue.

2.2.2 Comments (general)

- With the extensive set of diagnostics and reliable systems before BC2, excellent performance has been attained.

- The Coherent Optical Transition Radiation – *if this is the source of the variability in light emission* - is an interesting physics experiment, should be studied, but is not the point of the LCLS project.

- The beam position is moving on the order of the beam radius. The lack of accurate position measurement monitors after BC2 does not allow determination of the source.

2.2.2 Comments (general)

- The overall system availability can be severely impacted by legacy components that are near end-of-life and have a high-sensitivity to environmental and infrastructure conditions.

- The MATLAB interface software being implemented is very well done, will make future operations much more convenient, and not so expert driven. The separate routines still need to be integrated into a single overall package.

2.2.2 Comments (schedule & cost)

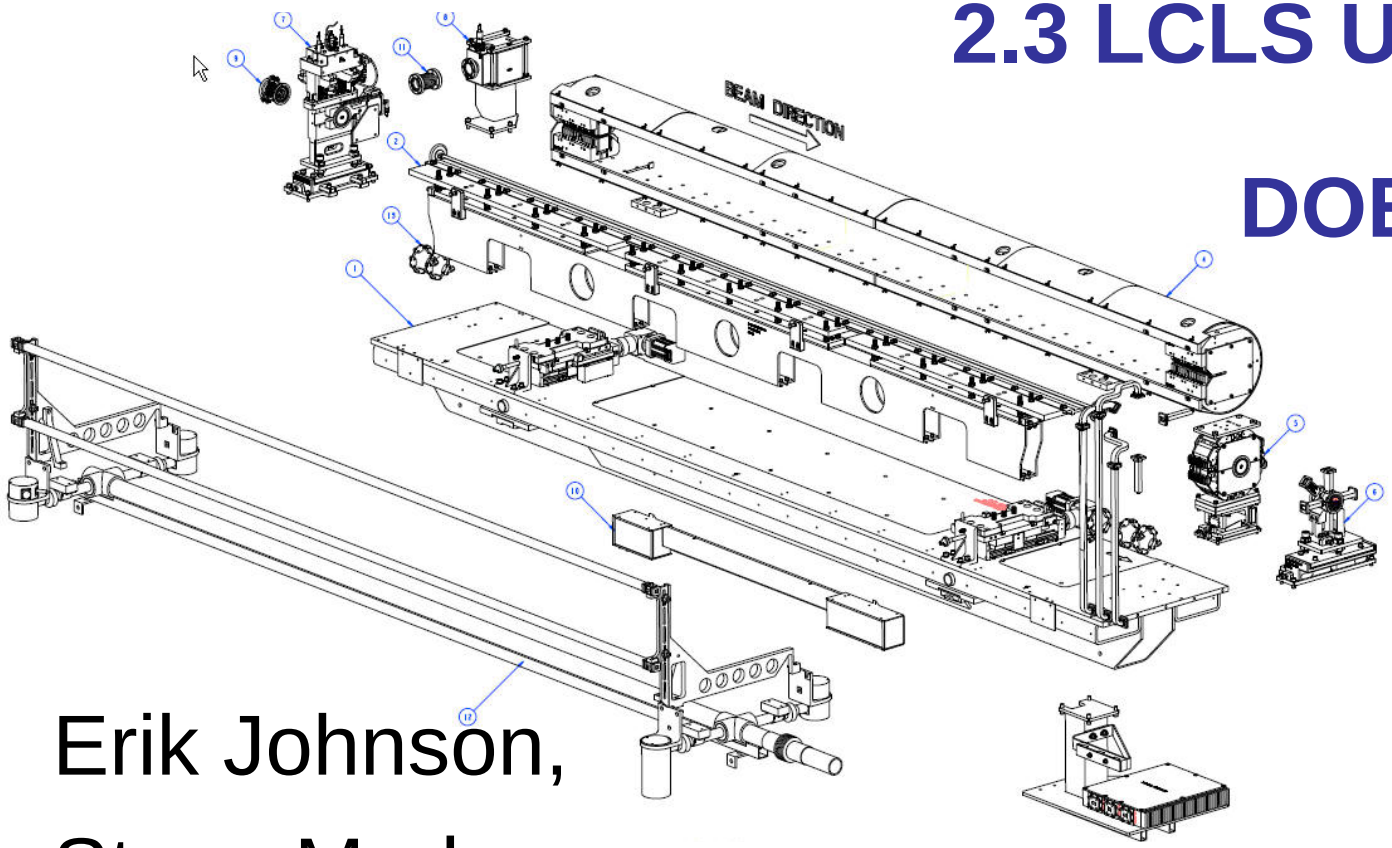
- Schedule has slipped one month due to process of sign-offs after submission, but well within contingency and will not affect meeting milestones.
- Contingency to complete the given scope is adequate.

2.2.3 Recommendations

- Establish schedule for early implementation of wire scanners in sector 24 and more higher resolution BPMs in the remaining linac.

2.3 LCLS Undulator

DOE Review



Erik Johnson,
Steve Marks,
Kem Robinson

13-15 May 2008

2.3.1 Findings
Notable good stuff…

- Vacuum Chamber
  - Aluminum extrusion successfully used for production run
  - Meets physics requirements
  - As of today all received at SLAC
- RF Beam Position Monitor
  - Unique, high precision diagnostic
  - Production problems sorted out
- Beam Loss Monitor (for undulators)
  - R&D run of design that meets minimum requirements (threshold detection) that may be extensible to dose monitoring
  - If successful could be production monitors in 2009

2.3.1 Findings(2) More good stuff…

- Team has been fully responsive to the recommendations from the July 2007 Review
- Cost, Schedule & Contingency (~30%) seem to be on track
  - should meet baseline objectives
- Designs, procurement & commissioning plans mature?
  - Components either complete or in production
  - Vacuum chamber and RF-BPM recovery notable success
  - *Attention is being paid to integration and commissioning*

2.3.2 Comments
Undulator tuning work ahead

- Temperature excursions in storage areas may result in need to refiducialize ~24 devices
- 8 devices required more involved tuning and adjustment than other undulators and were put aside to finish other devices first; *time to return to them*
- New shim designs could extend K range of undulators (enhanced performance)
- *Not much room left in schedule to re-redo undulator fiducialization*
  - Must be diligent in protecting finished magnets and girders from harm (temp, handling, storage…)
  - Make sure base program is covered before getting creative with improvements …

2.3.3 Recommendations

1. Complete the refiducialization of undulators as necessary and assure that 33 are RFI to meet project schedule.
2. Do Not Proceed with enhancements of the 'good field' region until recommendation 1 achieved.
3. Consider developing response plans for the undulators should they experience temperature excursions outside of specification (during storage, transit, or after installation)

2.4 Photon Beam Handling Systems

1.5/2.5 X-ray Transport, Optics, and Diagnostics (XTOD)
1.6/2.6 X-ray End Stations (XES)

&

Transitions to Operations and User Access Policy

Mark Beno (ANL), Chi-Chang Kao (BNL)
and Dennis Mills (ANL)

2.4 Findings

XTOD and XES:

- Costs, schedule, technical baseline, and contingency are consistent with the LCLS project data sheet. Photon Systems appears to have a realistic schedule to receive x-rays in the summer/fall of 2009.

- All orders for x-ray mirrors have been placed and soft X-ray mirrors are arriving.

- Detector work by Cornell is making very nice progress. LCLS staff are already controlling and acquiring data from prototype via LCLS Data Acquisition prototype system.

- Early science (AMO) experiments in mid-2009 appears to be ambitious; late 2009 are perhaps a more realistic goal. However, early science anytime in 2009 is at risk if approximately $2M (above expected FY09 CR budget) is not available at the beginning of FY09 (~$800K for AMO and another ~$1M for beam transport).

2.4 Findings (continued)

Interfaces/Integration of Photon Systems and LUSI:

- The interface between Photon Systems and LUSI appears to be functional, through sharing of engineering, controls and installation staff.

- However, development of final specifications for the LUSI instruments is required for final Photon Sciences planning and procurements (and for the hutches in the FEH) and is a significant schedule risk.

Transition to Operations:

- Plans for the transition to LCLS operations appear to be well advanced. The long-range staffing goals for LCLS User Operations provides a good mix of scientific and technical support.

User Access/Policy:

- Plans for user operations and access, while still a work in progress, are realistic and should provide the necessary basis for steady-state user access to the facility.

2.4 Comments

General:

- ~ $2M to complete x-ray transport and AMO. SLAC should make sure it happens

Transition to Operations:

- Facility operations will require a more mission oriented management structure.

2.4 Comments (cont.)

LCLS User Access:

- Involvement of Jochen Schneider in the development of the User Access Policy was an excellent decision. He brings both considerable experience (from HASYLAB/FLASH) and credibility to the process.

- Consider whether members of the LCLS Management on the Proposal Review Panel should be “advisory” or *ex officio* to remove any perception of bias in the proposal evaluation process.

- The sociology of experiments at LCLS will be different than storage ring sources (i.e.,formation of large collaboration of users with similar interests vs small individual groups). Early involvement of the LCLS user community (organization?) for input into this process and their education is strongly encouraged.

- Close interactions with LCLS management and the LCLS SAC is also encouraged to ensure highest scientific impact of the LCLS (especially the early experiments).

2.4 Recommendations

Transition to Operations:

- Define the operations management structure in the next 6 months to provide clear roles and responsibilities for staff.

User Access Policy:

- Finalize the User Access Policy in the next 3 months and make it widely available (including details of the proposal submission processes, criteria for proposal evaluations, etc.).

Section 2.5
Control Systems

Dave Gurd (ORNL ret)
Larry Hoff (BNL)

Findings and Comments

- The control system was available to support commissioning. Congratulations on timely delivery.
- The revised baseline addresses issues raised at the last review and everything appears to be covered. Contingency is adequate.
- Hiring of a Deputy in the Controls Department to focus on LCLS activities is an important and encouraging (if late!) development.
- We see no impediment to meeting CD4 on time

Findings and Comments

- There is now a clear separation of responsibilities for electron and photon control systems. Interfaces between these systems are supported by appropriate Interface Control Documents.

- Accelerator Controls is 78% complete and Photon Controls is 33% complete. Rolling these figures together is helpful to nobody.

Findings and Comments

- Commissioning to date has been supported by an impressive suite of applications developed in Matlab by the Physics team. The plan is to port these applications to XAL supported by the Accelerator Controls Team. An XAL model is a prerequisite and is currently under development.

- 5 Hz Matlab-based feedback loops have proven effective to date; however the current architecture would not be capable of supporting dramatically increased loop bandwidth should that prove necessary.

Findings and Comments

- An operating system failure in a PPS Programmable Logic Controller (PLC) resulted in a two week curtailment of the injector commissioning run. The safety envelope was not violated. The problem was easily identified and fixed. This incident also uncovered a configuration management (CM) issue that was appropriately addressed with new CM procedures.

- The legacy Machine Protection System has been adequate for commissioning to date. A new MPS system that will support 120Hz operation (required about a year from now) will be deployed this fall.

Findings and Comments

- The LCLS project baseline includes the use of some legacy systems, including Multibus-based controllers and high-level applications. A SLAC AIP has been proposed to replace these legacy systems with LCLS standard hardware and software technology. The aggressive target date is January 2009. Any serious problem with this upgrade could have a negative impact on LCLS commissioning. A technical review of the proposal is planned as soon as possible. The Committee agrees with both the need for the upgrade and for a review of the technical plan and mitigation strategies to avoid any negative impact on LCLS.

Recommendations

- None

SC2.6 Transition to Operations

- **Team: George Neil**
  Sam Krinsky
  Richard Sheffield

Findings

- **The performance of the injector/linac at 0.2 nC has greatly relieved the risk of failure in technical performance to CD4. Reliability of new systems is very good.**
- **Plans for transition to operations are in development and are at an appropriate level of detail for this stage;**
- **Excellent high level software programs have been developed by the physicists; process for transition to Controls Group is poorly defined and not happening due to lack of personnel**
  - **Example: high level simulation with integrated settings and tracking**

Findings

- **The lack of some diagnostics in baseline will hamper handover to operations and may delay schedule; some of these in the AIP list need to be moved up in priority: sector 24 scanners, replacement BPMs. Good diagnostics will save both time and money.**
- **Schedule for initial commissioning of wiggler and FEE next Spring is aggressive and success oriented; a slip would endanger early physics but not CD4**
- **The gun load lock is not in present budget or contingency allocation. The inclusion of a gun test stand in the overall program would bring significant long term benefits**
- **The development of capability for generation/transport of 1 nC is a longer term effort but not required for initial operation and lasing**

Findings

- **Comfortable with cost contingency; it reflects risks as presently understood.**
- **ISM being addressed at all stages of the planning. It was obvious that safety is being taken seriously by staff**

Comments

- **Congratulations on terrific work on the injector and linac. This success has eliminated a major potential technical risk**
- **Reliability of the drive laser has been very good and is ready to support operations. Failure data on older RF and other legacy systems was of some concern and may limit transition progress and operations availability**
- **Commissioning plans are key to keeping on track. This is good work in progress at excellent detail!**
- **The existing high level control programs are outstanding and provide confidence in the understanding of the physics. They will serve as a great basis for the more robust tools needed by operators in the future.**

Recommendations

- **Re-consider prioritization of AIP diagnostic items and establish schedule to provide required new and upgraded diagnostics (October 2008)**
- **Establish plan and support for transition of high level software to Controls Group (July 2008)**

3.0 LCLS Conventional Facilities
DOE Review 5/13-15/08

Dixon Bogert
Mike Schaeffer
Steve Sawch

Findings and/or Comments

Substantial progress has been made in the last ten months with the Conventional Facilities construction. The tunneling is complete and the tunneling subcontractor has demobilized and left the site.

The Turner contract is over 85% complete and on track for completion before December 2008 as contractually required. An LCLS Management schedule looks for beneficial occupancy of all areas within 120 days of this review. "Adequate staffing" by Turner subcontractors is required to reach this LCLS Management goal. A commissioning agent has been contracted to assist LCLS Management in accepting the work.

Some claims from changes to the Turner contract have been settled by negotiation; even more are outstanding.

Additional work (Far Experimental Hall hutches and office renovations) remains to be designed and constructed.

Findings and/or Comments

LCLS management expects the specification for the Far Experimental Hall hutches to be complete by June 30, 2008.

LCLS management expects the Title II design for both the hutches and office renovations in two existing SLAC structures to begin by July 31, 2008. Contracts for construction should be bid and awarded immediately thereafter. In the absence of Title II designs for this work the cost estimates at present are based upon conceptual design only.

Adequate contingency must be retained until the remaining work is under contract. The final cost of CF construction is dependent upon the settlement of the claims arising from the Turner contract.

Safety incidents from work under the Turner contract have been higher than expectations; LCLS management has responded urgently. The safety record on work outside the Turner contract has been good to date.

Recommendations

1. Continue to monitor Turner's schedule to completion.

2. Confirm that Turner and the Turner sub-contractors are maintaining sufficient staffing to complete the work on schedule.

3. Complete the specification for the Far Experimental Hall hutches by June 30, 2008; consistent with the schedule presented.

4. Begin the Title II design for the Far Experimental Hall hutches and the two office building renovation projects by July 31, 2008; consistent with the schedule presented.

5. Review the cost estimate from the A&E for this remaining work not under contract as soon as the Title II work for the Far Experimental Hall hutches and office renovations is complete.

6. Retain a contingency allowance of between 30 and 50 percent for all Conventional Facilities work for which a final design and an accompanying cost estimate are not in hand today. Retain that level of contingency until contract award.

7. Continue to examine and implement proactively all possible factors necessary to achieve an exemplary safety record on the remaining work.

8. Settle claims.

4.0 ES&H SUBCOMMITTEE

Arnold Clobes

LLNL/NIF

Findings

- Recommendations from the July, 2007 Review have been adequately addressed.
- LCLS CF subcontractors, and Technical Systems Installation is well managed with an exceptional safety record. (zero recordables in 100k work hours).
- In spite of robust presence and close project management attention, LCLS safety experience on GC managed construction during the past year has failed to meet DOE goals. The DART rate is approximately twice the average US construction experience.

More Findings

- The LCLS management and SSO have taken proactive steps to improve safety of GC managed work that are starting to show results. These steps include:
  - Increased site presence and visibility by line management and safety support by LCLS, SLAC, and SSO.
  - Daily Team walkthroughs that include LCLS/Turner and SSO/LCLS/Turner
  - During the walkthroughs emphasis is on positive safety reinforcements with workers, in addition to compliance.
  - Improved process for sharing of Daily Safety Observations with Turner for Corrective Action.
  - Formation of Safety Stewardship Committee consisting of Turner and LCLS that meets weekly to collaboratively solve safety problems.
  - Development and implementation of more robust Work Planning and Control (JSA's and Daily pre-Task Plan).
  - Addition of full time paramedic and second shared paramedic/safety representative for robust management of injuries.

More Findings

- The project experienced minor environmental discharge incidents during construction below notification thresholds. Winter storms overwhelmed SWPPP materials and immediate corrective actions taken.
- Project safety documentation (e.g. Fire Hazard Analysis, Hazard Analysis Review, etc) has been reviewed periodically throughout the project life cycle, and are current.

Recommendations

- Develop a Post-Construction Project Safety Evaluation addressing the project safety organization and Lessons Learned, for the benefit of future BES projects. Completed by next Review.
- Develop and implement an End-of-Construction Safety Plan addressing safety issues unique to GC/subcontractor demobilization from the site. Completed by June 15, 2008.

5.0 Cost and Schedule

Review Committee for the Linac Coherent Light Source

13-15 May 2008

Cathy Lavelle, BNL

Angus Bampton, PNNL

Steve Tkaczyk, DOE/SC

5.1.1 Findings

- The project was rebaselined in January 2008 the BCR was approved February 7, 2008;
  - Increased the TPC from $379M to $420M
  - Extended the completion of the project at CD-4 from March 2009 to July 2010.
- Two months of cost/schedule data has been assessed for performance.
  - The cumulative CPI/SPI for February and March 08 are both 1.0. In March project 76% complete.
  - Project baseline is well-developed and integrated.
- Project controls tools are being utilized to manage the project cost/schedule performance.

5.1.1 Findings

- The project baseline assumes no funding constraints in FY09, early funding needed in October 08.
- The risk management process is well developed and being utilized for decision making by management team for the TEC.
- The project performed Monte Carlo analysis to assess cost and schedule contingency.
- The renovation of the lab and office space is conceptually designed.
- The project has responded appropriately to the project cost and schedule recommendations from the July 07 review.

5.1.2 Comments

- The project has planned an aggressive cost/schedule baseline for FY09 in order to Initiate Early Experimental Operations (L2 milestone).
- If there is a CR in FY09 early science objective is in jeopardy.
- The risk management process should be applied to all scope within the line item project – eg. commissioning.
- The process of applying schedule contingency at various points in the schedule is a good approach.
- The office renovation plans/design need to be detailed in order to integrate this scope into the cost/schedule baseline.
- The LUSI schedule baseline is needed to understand the impact to the LCLS installation schedule.

5.1.3 Recommendations

- Consider utilizing the Risk Management process to its full capability across the entire scope (TPC) of the project.
  - Conduct risk identification for the OPC portion of the project.
  - Add renovation of the office space to the risk registry.
- Explore alternatives to secure early funding needed to minimize a potential CR impact.
  - e.g. SLAC, site office, ORO

6.0 Management

Brenna Flaugher, FNAL

Kurt Fisher, DOE-NNSA

Frank Crescenzo, DOE-BHSO

Les Price, Consultant

Findings & *Comments*

- Very impressive progress in site construction, hardware, and initial commissioning. Delivery of LCLS quality beam the end of the linac is a significant achievement. Two of four technical performance parameters which define CD-4, project completion, have already been achieved.
- *John Galayda and his project team are to be commended for these achievements, especially in a climate of change and uncertainty.*
- *The project team responded well to the recommendations from the July 2007 review*

Management - 2

- *LCLS is on track for successful achievement of technical, cost and schedule goals.*
- *While the cost and schedule status appears to be in satisfactory condition, there is currently no plan to update the estimate-to-complete from the rebaseline estimate which is now ~ 6 months old.*
- *LCLS uses a project specific overhead rate structure for the TEC work but not for the OPC work. This is not consistent with other recent SC projects and is believed to be a carryover from historic SLAC lab practices. Continuation of this practice is both unnecessary and a cause for additional costs to the project.*
- *As LCLS nears completion. Project staff should develop a "lessons-learned" document to capture information that would be useful for future SC projects.*

Management - 3

- The LCLS Project has constructive relationships with DOE, both BES and SSO. All parties are fully committed to project success.
- A number of institutional areas that impact LCLS are in transition. For example, Stanford University has become much more engaged and supportive of SLAC activities. A university VP for SLAC has been appointed and is already making a positive impact. The new SLAC Director has initiated changes to the laboratory organizational structure designed to strengthen SLAC effectiveness overall and LCLS as the flagship science facility in particular.

Management - 4

- Planning for transition of LCLS from a construction project to an operating facility in the SLAC institutional environment is underway. A vision for restructuring the LCLS organization has been developed and is partly implemented under the Acting ALD.
- *DOE, SLAC, and LCLS itself would be well served by developing an "End Game Plan" that would more fully develop the strategy and plans for completing project activities and the transition to operations.*
- *The definition of the completion of the lower level project activities, for example completion of operations manuals and as-built drawings, should be part of the End Game planning.*

Management - 5

- ANL and LLNL work is nearing completion and hardware will be delivered to LCLS.
- *LCLS should assure that it has assigned appropriate staff to receive, install and commission this equipment in cooperation with ANL and LLNL.*
- The LUSI MIE Project remains in the LCLS organizational structure, but with revised Roles & Responsibility's that match the vision for the new LCLS Directorate.
- *So far, this revised approach seems to be on the right track.*

Management - 6

- A March 2007 review of SLAC wide procurement practices resulted in a dramatic reduction of the lab's procurement authority. Since then, SSO has given special attention to LCLS procurements in order to minimize impacts.
- *SLAC and SSO should work together to resolve these issues and restore a more reasonable authority to the lab. This will be important for LUSI.*
- A Continuing Resolution at the beginning of FY2009 is likely. LCLS needs ~$5 million BA in October in addition to the expected CR allocation in order to execute the baseline plans.
- *DOE and/or SLAC should be able to provide this added funding within the guidelines that apply during a continuing resolution.*

Recommendations

- Complete a bottoms-up estimate-to-complete (ETC) in approximately 6 months.
- Develop and provide to DOE an “End Game Plan” in approximately 6 months.
- Confirm that the plan for accommodating the early FY2009 funding requirements can be met.