Department of Energy Mini-Review Summary of the Linac Coherent Light Source (LCLS)

Date: November 17, 2005
Location: Stanford Linear Accelerator Center (SLAC), Menlo Park, CA
Committee: 2DOE members; 1 technical consultant

Summary: The purpose of the Linac Coherent Light Source (LCLS) mini-review was to do an interim assessment of the project's progress in preparation for planning a full review in February 2006. That February 2006 review is to support CD-3b (Approve Start of Full Construction) approval. **Overall, the project has made significant progress. The Committee was impressed with the 60% Title II Conventional Facilities (CF) documentation (based on a cursory review of drawings). Many of the concerns expressed at the May 2005 review have already been addressed satisfactorily.**

1. Project Status as of September 30, 2005

(Relative to the Level 0 Baselines in the approved LCLS Project Execution Plan)

• TEC:	$315.0M	
• TPC:	$379.0M	
• Percent Complete:	Planned: 15.3%	Actual 14.7%
• Project Completion date:	Baseline: 3/09	Forecast: 3/09
• Contingency:	$ 65.9M or about 31.3% of remaining TEC-work	
• ES&H	No safety or environmental concerns	

2. Technical

Good design and procurement progress has been made since the last DOE review (May 2005) across all technical areas. There continues to be good integration of ANL, LLNL, and SLAC design activities. The injector installation has begun on schedule, and all long lead procurements (LLP) for technical hardware have been awarded. Fabrication of injector, linac, and undulator components (strongbacks, magnet poles and blocks) is underway at the vendors. The two undulator assembly contracts were awarded and the first articles are on schedule. Market experience on these hardware LLPs has been quite good, yielding several $M that has been returned to contingency.

Issues:

- Proposed design changes affecting the Far Experimental Hall layout have been finalized and approval to proceed with the new layout design was given to the architect engineer (Jacobs). The 60% Title II design package reflects the new layout.
- The project identified critical activities for the October 2005 shutdown which met their needs to install the injector system at Sector 20. Remaining activities are scheduled for the 2006 and 2007 shutdowns.

3. Conventional Facilities

Title II CF design is continuing, although a few weeks behind schedule. The 30% Title II design package was delivered in August 2005. A Value engineering (VE) effort was conducted to offset growth in the CF cost estimate. The 60% Title II design package (except for the cost estimate, which is due to arrive in early December) was delivered the day before this mini-review that included many of the VE options. **The procurement for the Construction Manager/General Contractor (CM/GC)** was awarded to Turner Construction in October 2005. Turner is developing an independent cost estimate for the 60% design and has begun preparing a construction schedule. The Sector 20 and Magnet Measurement Facility construction elements (part of LLP) are going well and should meet an early completion date of February 2006. This allows early installation of the injector drive laser in Sector 20.

Issues:

- The project evaluated the technical requirements for the Undulator Hall and relaxed the performance requirements for the HVAC, mechanical, and electrical systems. A parallel design for the undulator tunnel HVAC was initiated in July when the project determined the base HVAC design was increasing in cost.
- Based on a cursory review of the tunnel drawings, the Committee was impressed with the maturity of the 60% Title II documentation.

4. Cost, Schedule, and Funding

Through September, cost contingency (31.3% of the TEC work to go) and schedule contingency (about 10.5 months) are believed to be adequate. Project cost estimates and schedules are reasonably detailed, and the critical path appears to be well understood. The project is about 14.7% complete, and the cost is on track (CPI=1.0) and schedule variance (SPI=0.96) is small. An OECM EVMS certification review is scheduled for March 2006.

Based on the 60% design documentation, new cost estimates for CF are being prepared by Jacobs, Turner and a consultant. These will be available in December 2005. Value engineering continues. These efforts will be concluded in time for the full DOE review next February, along with the 100% Title II design package due at the end of January. A reassessment of cost and schedule contingencies will be made at that time and the risk management plan will be updated. The committee remains very concerned about the costs for tunneling on this project.

5. Management and ES&H

SLAC management responded positively to the action item regarding the Laboratory's commitment of resources to LCLS and evaluation of readiness for start of construction in March 2006. SLAC submitted a report and discussed the results with BES last July. In general, **the three partner laboratories (ANL, LLNL, and SLAC) are working well together**. The necessary ES&H documentation is complete or on schedule. A comprehensive construction safety program is being established that has been proven to work well on other projects.

Issues:

- In response to a recommendation from the May review, the project institutionalized a formal change control board that includes all partner labs which meets weekly.

6. Action Item - Conduct the next DOE Review at SLAC in February 2006.