Specific Questions and Documentation Requests
SLAC LCLS EIR

Some of the objectives of this review are to ensure that the documentation properly reflects the work scope and that management controls, procedures and appropriate reporting processes are in-place—consistent with the implementation plans, contract and DOE 413.3A requirements and guidance. Following are initial questions intended to gain an understanding of these issues:

1. Work Breakdown Structure

- What is "XTOD Management"? (WBS 1.05.01.01.02)

  Response: *WBS 1.05.01.01.02, "LLNL Project Support", is a WBS element which covers the administrative support required at LLNL for the LCLS X-ray Transport, Optics, and Diagnostics (XTOD) group. From the WBS dictionary: "This covers a half time administrator, and funding for programmatic travel to attend weekly staff meetings, recruit project staff, prepare monthly reports, prepare reviews, and other required project documentation."*

2. Resource-Loaded Schedule

- Please provide the Project Management Control System Description or otherwise describe how escalation and resource rates are determined.

  Response: *The LCLS PMCS documentation will be provided during the on-site visit.*

- Please provide the detailed cost estimates for the selected WBS elements.

  Response: *This has been provided prior to on-site visit*

- The Level 4 BAC spreadsheet provided to the EIR team shows a total of $379.9 M as compared to the total proposed baseline shown in the PEP of $381.4 M (TEC of $319.05 M + OPC of $62.33 M) – please explain this difference.

  Response: *Latest PEP has fixed this.*

3. Key Project Cost, Schedule, Technical and Programmatic Assumptions

- How were the "Funding Assumptions" for Project Contingency (the difference between TEC funding and TEC base cost) and Management Reserve (the difference between OPC funding and OPC base cost) derived?

  Response: *A risk-based contingency assessment was performed on all*

remaining TEC work as per guidance in PMD 1.1-021. This bottoms-up assessment was used to determine the TEC funding. For OPC funding, the management reserve assessment was performed top-down by the Project Office. This top-down approach is considered reasonable for OPC since most tasks are related to Level-of-Effort commissioning.

- Please provide the escalation rates that were used to develop the ETC and provide the basis for those rates.

  Response: *This information will be provided during the RLS presentation.*

- Please provide the adders and markups applied to estimated costs (G&A rate, etc.)

  Response: *This information will be provided during the RLS presentation.*

4. Critical Path

- Be prepared to discuss the Critical Path, the Critical Path + 30 days, and the Critical Path + 60 days for the remainder of the project. Address the differences between the current schedule and the proposed revision.

  Response: *(Please clarify) Are you looking for the top 3 critical paths? If so, this will be provided during the Critical Path presentation. The differences between the current schedule and the proposed revision will be addressed during the Project Mgmt and System Manager briefings.*

5. Risk Management

- Discuss the cost and schedule contingency derivation from the risk assessment.

  Response: *Bottoms-up estimates of schedule risk have been performed for each activity on the critical path to achievement of Critical Decision 4 requirements. The estimates are based on recent experience with LCLS construction activities. Limit on budget authority in FY2008 is taken into account. The critical path requires 615 workdays. The early finish date is 101 days in advance of the CD-4 target. The Monte Carlo analysis indicates a probability greater than 90% that the CD-4 milestone will be achieved on or ahead of schedule. A Monte Carlo analysis of contingency has been performed for the Project, combining bottoms-up contingency estimates and quantitative assessment of the cost impacts of Risk Register entries. In general the Risk Register entries and their financial impacts are distinct from the bottoms-up contingency assessments. Among the most significant risks are of a global nature (such as a stand-down of all work triggered by a safety incident) which force a correlated change in the cost of all WBS elements. Therefore the statistical combination of bottoms-up contingency estimates and risks gives a more realistic picture of cost contingency requirements.*

- Please provide the basis for the cost and schedule contingency allowances and explain how those allowances are managed. The factors used for cost contingency are presented, but please provide the lowest level analysis that was used to derive the overall contingency allowance and explain how the schedule contingency allowance was derived.

  Response: *Risk-based contingency allowances are provided in PMD 1.1-021. A lowest level analysis is shown in the LCLS Detailed Cost Estimate and will be available during the on-site visit. Schedule contingency is included in the LCLS project to allow for future activities which can only be broadly planned at this time as well as uncertainties in the durations of remaining work. Authorized schedule contingency is shown as the difference between the DOE approved target milestone date for the project completion milestone (CD-4) and the project's target milestone date for the same event. The LCLS schedule includes approximately 5 months of float for CD-4, which conforms to roughly 1-1/2 months of schedule float for each year of remaining work, which is considered adequate for the remainder of the project.*

- Please provide the results of the quantitative (Monte Carlo) risk analysis and explain how this analysis was used to establish the project cost and schedule contingency estimates.

  Response: *As stated above, the critical path requires 615 workdays. The early finish date is 101 days in advance of the CD-4 target. The Monte Carlo analysis indicates a probability greater than 90% that the CD-4 milestone will be achieved on or ahead of schedule.*

- What level of confidence is implied in the proposed baseline (cost and schedule)?

  Response: *The first, including bottoms-up contingency estimates only, predicts 100% likelihood that the Project will be completed within the TEC. The second analysis, including both bottoms-up contingencies and the Risk Registry, predicts 85% likelihood that the Project will be completed within the TEC.*

- **6. Funding Profile**

- Provide a crosswalk from the "approved funding profile" to the "proposed funding profile."

  Response: Both the "approved funding profile" and "proposed funding profile" will be provided at the on-site visit.

- Please provide a copy of the DOE Directed Change documentation that is the basis for the proposed BCP (that documents the impact of the FY 2007 CR).

  Response: *Directed change guidance will be provided at the on-site visit.*

- Please explain why the project plans did not anticipate a delay in receipt of full FY 2007 funding due to a CR. If project plans did not incorporate normal CR expectations, was this addressed in a Risk with an associated cost and schedule impact estimate?

  Response: *The project has considered continuing resolution impacts annually by planning the start of new activities or large procurements to occur three months into the new fiscal year, where practical. Three months, or one quarter, is used as a planning assumption based on the average length of the past several continuing resolutions, which have not resulted in any funding reductions. The FY2007 CR was unusually long, six months, before the funding level was finalized and also resulted in a decrease in peak year funding.*

- Please explain how future CR's or potential funding level changes will be handled – what has been assumed and incorporated into project plans, since there is no risk identified?

  Response: *The revised baseline makes the same planning assumption as stated in the response above. That is, activities or procurements that require large budgets are planned to begin in the second quarter of the fiscal year anticipating a continuing resolution for the first quarter. As a note, since FY2007 was the peak funding year for the project any future CR will have little or no impact on the project as the funding level will be less than the previous fiscal year. The CR will allow funding at the lower of House or Senate marks or the previous fiscal funding level. Future funding level changes will be handled with contingency if sufficient funds allow and depending on the magnitude of the funding change. However, funding level changes are out of the project's control, are externally driven therefore these changes are handled as a Directed Change, as defined in DOE O 413.3A, similar to the situation in FY2007.*

7. System Functions and Requirements

- No questions at this time.

8. Startup Test Plan

- Provide documentation to support the Project's plans for successful startup of the LCLS.

  Response: *The revised Start-Up Plan will be provided at the on-site visit.*

9. Project Execution Plan

Our review will assess whether the Project Execution Plan reflects and supports the way the project is being managed; is consistent with the other project documents; and establishes a plan for successful execution of the project

- Please provide a representative copy of the bi-annual LCLS status report from the LCLS Advisory Committees, one each from the FAC, SAC and CFAC.

  Response: *Copies of the final reports from the meetings will be given to the EIR Committee upon their arrival to SLAC.*

- How does the PMOG fit into the organization chart "Figure 3"?

  Response: *The Director of the Stanford Linear Accelerator Center (SLAC) chartered the PMOG to oversee the LCLS project. The PMOG, which is an external review committee, reports to the SLAC Director. Figure 3 is the LCLS organization therefore the PMOG reporting relationship is not shown.*

- Please provide a copy of the LCLS Advance Procurement Plan defined on page 12 of the PEP.

  Response: APP has been updated.

- Please provide a copy of the LCLS Project Management Plan defined on page 16 of the PEP.

  Response: *The revised Project Management Plan will be provided at the on-site visit.*

- Be prepared to discuss the Change Control process employed for the Project. Please provide any Change Control documentation (forms, logs, etc.) created to date.

  Response: *The LCLS Project Management Plan describes the LCLS Change Control process.*

- Be prepared to discuss the Configuration Control process employed for the Project and provide any configuration control documentation created for the project.

  Response: *The LCLS configuration controls process will be discussed during the System Functions and Requirements break-out of the on-site EIR visit*

10. Integrated Project Team

We will assess whether the project management staffing level is appropriate; determine if appropriate disciplines are included in the Integrated Project Team (IPT); and identify deficiencies in the IPT.

- The Integrated Project Team (IPT) member responsibilities are described in the PEP. Are the duties and responsibilities of the IPT being met?

  Response: *Yes, the duties and responsibilities of the IPT are being met. The key members meet weekly to discuss project status and issues. Additional IPT members are brought in as the need arises depending on the phase of the project or the issues to be resolved.*

- Are the other laboratories (ANL and LLNL) represented on the IPT?

  Response: *Yes, ANL and LLNL are represented in the IPT. Page 10 of the PEP identifies these individuals as the ANL-LCLS Project Director and the LLNL-LCLS Project Director.*

- How is the performance of the IPT evaluated?

  Response: *The FPD identifies issues of IPT performance and raises them at meetings. Overall, the IPT has functioned very well and issues of performance have not been an issue.*

- What role did the IPT play in developing the PEP?

  Response: *The key members of the IPT played integral part in developing the PEP. The IPT members prepared, reviewed or commented on the PEP.*

- In brief, what are the professional qualifications of the IPT members? What training requirements are imposed on the IPT? How are these monitored?

  Response: *Qualifications of the key IPT members follows:*

  <u>FPD</u> - The FPD has attained level 3 certification and has maintained certification through continuing education in accordance with DOE O 413.3A. The incumbent has been the FPD since the inception of LCLS. The incumbent has also served as the FPD for several other projects since 1996. Training requirements are defined in DOE's Project Management Certification Development Program.

  <u>Deputy FPD</u> - is a Physical Scientist with over 15 years of DOE project and program management experience in the field. During his tenure with DOE and National Nuclear Security Administration (NNSA), he has managed major portfolios of mission critical program elements and projects for the Defense (DP) and Nuclear Nonproliferation (NN) programs, as well as Nuclear Energy programs. The DOE level 3 FPD certification is pending.

  <u>SLAC LCLS Project Director</u>

  - *PhD in Physics (Rutgers)-1977*
  - *Brookhaven National Lab (BNL) 1977-1990 National Synchrotron Light Source*
  - *Argonne National Lab (ANL) 1990-2001 Advanced Photon Source*

(APS) Accelerator Division Director during APS construction phase (~$330M).
- *Stanford Linear Accelerator Center (SLAC) 2001-Today. LCLS Project Director*

SLAC LCLS Deputy Project Director

- *BSME (Illinois Institute of Technology)-1992, MBA (Northwestern University)-1996, Registered PE-Illinois. Certified Project Manager-2007 (Stanford University)*
- *Fermi National Lab (FNAL) 1987-2003*
- *Deputy Project Manager US CMS Detector Project (~$167M)*
- *Stanford Linear Accelerator Center (SLAC) 2003-Today. LCLS Deputy Project Director*

- Who authored and approved the IPT charter? When was it created?

  Response: *The IPT prepared and approved the charter. The charter was approved initially in the Preliminary Project Execution Plan for the Project Engineering and Design Phase and re-affirmed with subsequent approvals of the Project Execution Plan.*

- How and by whom are the Integrated Project Team members selected?

  Response: *The key members of the IPT are defined as the FPD, Deputy FPD, BES Program Manager, SLAC LCLS Project Director, and SLAC LCLS Deputy Project Director. The SLAC Director and the DOE Acquisition Executive approved the key members of the IPT. The key members of the IPT select additional members to the IPT depending on the phase of the project or the issues to be resolved.*

- How does the IPT function? Does it meet periodically, or as required only, or not at all?

  Response: *The key members of the IPT meet weekly to discuss project status and issues. Meetings are documented and action items are identified as needed. Other members of the IPT, e.g., procurement, have regular status meetings. If necessary, the FPD/contractor PD also call for special IPT meetings.*

- What products are produced by the IPT, such as meeting minutes, directives or suggestions? Please provide representative examples of such documentation.

  Response: *Meeting minutes are documented. A sample will be provided to the EIR committee during the on-site visit.*

- **Miscellaneous Items**

- Please provide the current data sheet for the project.

Response: *The FY2008 data sheet is the most current and will be provided during the on-site visit. Note: The FY2008 data sheet shows the funding profile based on the current approved project baseline. The revised baseline funding profile is different and has been provided to the EIR committee on the EIR website and will be presented during the on-site visit.*

- Please provide an explanation of the original concept for office space—what type of building (or buildings) was envisaged, what was the square footage, where was it located, etc., and compare this configuration to the present concept of rehabilitated existing structures.

  Response: *The Conceptual Design Report (SLAC-R-593 http://www-ssrl.slac.stanford.edu/lcls/cdr/) describes the original concept for LCLS conventional facilities. The Near Experiment Hall was a single-story 30 m x 55 m building with steel frame and skin, to be located in the Research Yard. It was to serve approximately the same purpose as the sub-basement level of the present Near Experiment Hall. The concept included ten offices or control cabins for experimenters. The Far Experiment Hall was conceived as a two-story structure, 35m x 57m, located just west of the present location of the Near Experiment Hall. It was envisioned to contain hutches on the below-grade lower level and 95 offices and 18 laboratory/support areas. Approximately 120 persons could be accommodated in the Near Experiment Hall and Far Experiment Hall together.*

  The designs of the experiment halls and office space were extensively modified in the 2004 baseline. The modifications were motivated by advice from Office of Science that the Project design should provide expansion capability in the LCLS. In order to do this, it was necessary to move both experiment halls east. This made it possible to connect more free-electron lasers to the SLAC linac at some future date without demolition of portions of the original facility. The Near Experiment Hall was moved to its present location and the Far Experiment Hall became an underground cavern near the east boundary of the SLAC site. An office building (termed the "Central Lab Office Center" or CLOC) was to be placed immediately above the Near Experiment Hall.

  The Title-I design of the CLOC was presented to the 2004 EIR as a 68,300 gross square feet (GSF) office building containing six laser laboratories and office space for about 300 personnel, including all LCLS scientific/engineering staff, visiting researchers and students. The Project baseline was established in April of 2005 with a TEC of $315M. In March and April of 2006, bids on the first major subcontracts for the "beam path" (Beam Transport Hall, Undulator Hall, Beam Dump, Front End Enclosure, Near Experiment Hall, X-Ray Transport Tunnel, Far Experiment Hall and Far Hall access tunnel) were received, and exceeded forecasts by a significant margin. The bids were considered in light of a February 2006 bottoms-up risk assessment which indicated that the Project could award no more than $85M in subcontracts without undue risk of exceeding TEC. The Project awarded all subcontracts excepting the CLOC, retaining adequate contingency to finish the Project. The Project and SLAC management considered alternatives for

meeting the space needs of the LCLS. It was determined that the Project's space needs for facility staff could be met by renovating buildings 751 and 28. Office space for over 149 staff can be provided in these two locations.

Changes in SLAC long-range planning made the reprogramming of Buildings 751 and 28 a logical choice. At the start of the LCLS Project, it was considered likely that these buildings would be required to support the proposed Next Linear Collier project. By the time LCLS civil construction subcontract bids were received, it had become apparent that these buildings could instead be made available for LCLS staff. This was confirmed by a sitewide space inventory assessment, performed by the SLAC Director's office.

Building 751 is conveniently adjacent to the Near Experiment Hall and the entrance to the Far Experiment Hall. It already contains office space, a small machine shop and overhead crane coverage. Plans were already underway to house SSRL scientific staff and LCLS instrument scientists working on the LUSI project in building 28. The required renovations are estimated to cost $5M, which is in the Project budget. The adjacency of LCLS and LUSI personnel is advantageous; LUSI (LCLS Ultrafast Scientific Instruments) is a "major item of equipment" project producing experimental instruments that will be installed in the LCLS facility. Management of the interfaces between LCLS and LUSI are facilitated by shared occupancy of Building 28. Laser labs, staff offices and support areas required for LCLS experiments will be available, as originally planned, in the Near Experiment Hall and Far Experiment Hall. The Integrated Project Team and SLAC management concluded that the LCLS scientific mission and staff space needs could be fulfilled satisfactorily in this way, without need to request a change to the TEC. A Baseline Change Request to suspend construction of the CLOC was prepared and approved by the Project and by the Federal Project Director.