

# Key Project Assumptions for the LCLS Project

## General Assumptions, Definitions and Statements used on the LCLS Project

The following key cost, schedule, technical and programmatic assumptions are used in establishing the LCLS revised Performance Measurement Baseline (PMB):

### General Assumptions

- This External Independent Review (EIR) is a “Limited EIR” covering the Project’s Estimate to Complete and is focused on the following elements: Resource-Loaded Schedule, Key Project Cost and Schedule Assumptions, Funding Profile, Critical Path, Risk Management, and Project Execution Plan. The review is not an assessment of past performance, work accomplished or a re-assessment of unaffected areas of the project.
- The LCLS Project is compliant with DOE O 413.3A, *Project Management for the Acquisition of Capital Assets*, and strives to incorporate ‘best practices’ from other large-scale first of a kind large scale science projects around the DOE complex.
- The Estimate To Complete is for remaining work as of the June 2007 approved Performance Measurement Baseline.

### Funding Assumptions

- As per guidance from DOE-BES, LCLS funding restoration against its approved funding profile will not take place until FY2009.
- LCLS defines the term ‘Project Contingency’ as the difference between TEC funding and the TEC estimated base cost. LCLS defines the term ‘Management Reserve’ as the difference between OPC funding and the OPC estimated base cost.

### Cost and Schedule Assumptions

- All escalation and resource rate calculations will be consistent with PMD 1.1-015 (Project Management Control System Description). Future labor costs will use the most likely escalation on prevailing salaries.
- Schedule estimating, cost estimating and contingency assessment calculations will be consistent with PMD 1.1-020 (Project Schedule Procedure) and PMD 1.1-021 (Cost Estimating Procedure).
- LCLS utilizes a hierarchy of milestones to monitor project progress.
  - Level 4 (L4) milestones are defined, monitored and managed by the System Managers. These are ‘early finish’ milestones without float.
  - Level 3 (L3) milestones are defined, monitored and managed by the Project Office. These are assigned fixed dates with 1 month float to the L4 milestone. Float between L4 and L3 is monitored monthly.

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- Level 2 (L2) milestones are defined, monitored and managed by the DOE Federal Project Director. These are assigned fixed dates with 2 months of float to the L4 milestone. Float between L4 and L2 is monitored monthly.
- Level 1 (L1) milestones are defined, monitored and managed by the DOE Acquisition Executive. They are used as a basis for approval of project Critical Decisions.
- LCLS uses a 250-day working calendar (~20 working days / month) to relate activity durations to calendar dates for milestones. Regularly scheduled holidays are correctly handled in determining milestone dates. Estimates of average individual vacation time and personal time are used for relating work hour estimates to FTE requirements, and for budgeting level- of-effort personnel. Indirect (G&A) estimated costs are consistent with approved laboratory rates.

### Contingency Assumptions

- Schedule Contingency –
  - Project milestone dates at levels 3, 2 and 1 include contingency to allow the Project CAMs and System Managers some discretion in scheduling activities in response to changing conditions, the need to re-sequence work activities, and other factors, that introduce uncertainties in the durations of remaining work. The amount of schedule contingency is also dependent upon the risk within the individual schedule activities.
  - Authorized schedule contingency is shown as the difference between the DOE approved Level 1 and Level 2 target milestone dates for project completion milestones and the project's target milestone date (early finish) for the same event.
  - The LCLS schedule includes approximately 5 months of float for CD-4, providing over 1-1/2 months of float for each remaining year of work. Based on the schedule risk analysis, total float is considered adequate for the remainder of the project.
- Scope Definition and Contingency – The LCLS Project Execution Plan (PEP) defines the Project scope in terms of Project performance goals: technical performance, cost and schedule. Construction Project deliverables are defined in detail in the resource-loaded schedule. Changes to Project deliverables are subject to approval by LCLS Project Management and by the Department of Energy, according to the PEP. Procedures for the Baseline Change Request process are defined in the LCLS Project Management Control System Description, PMD 1.1-015.
- Cost Contingency –
  - A risk-based contingency assessment is performed at the lowest WBS level consistent with PMD 1.1-021 (Cost Estimating Procedure).
  - Authorized Project cost contingency is shown as the difference between the DOE Total Estimated Cost (TEC) and the project's approved estimated base cost.
  - Adequate contingency is available on a year-by-year basis to address unplanned issues; however FY08 shows the least available contingency. To address the need for additional contingency in FY08, LCLS has identified FY08 procurements that could be deferred until FY09 should the need arise.

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## Risk Management Assumptions

- The Risk Management process assesses and quantifies potential cost and schedule impacts to the Project which are not explicitly budgeted or otherwise acknowledged in the Project cost and schedule baseline or bottoms-up contingency estimates. The possible financial impacts of these risks are estimated quantitatively in a “Monte Carlo” contingency analysis.

## Project Interface Assumptions

- Fund type Definitions
  - TEC (Total Estimated Cost) – The TEC portion of the project scope is reserved for construction resources and activities. This includes planning, design, construction, installation and checkout. The logical end of TEC activities is the installation phase.
  - OPC (Other Project Cost) – The OPC portion of the project scope is reserved for non-construction activities such as R&D, spares and commissioning, or first pre-operational tests of the performance of major (WBS level 2) LCLS systems such as the Injector, Linac, Undulator, etc. Installation is budgeted in the TEC, following the completion of installation, commissioning begins. Commissioning activities are budgeted in OPC. OPC is assumed to cover all costs associated with commissioning newly installed LCLS equipment. Commissioning activities are fully complete at CD-4.
- Transition to Operations – LCLS plans a phased transition into operations as each major subsystem completes its commissioning goals. The first major subsystem is the Laser and Injector Facilities which met their commissioning goals in August 2007 and are now supported by Linac Operations funding. Once a major subsystem is turned over to Linac Operations, no additional project funds, either TEC or OPC will be applied to these subsystems. Experiment operation activities in the LCLS Near Experimental Hall will be supported by a separate funding source, LCLS Experimental Operations funding, in FY2009.

## External Assumptions

- Maintenance & Operations – It is assumed that all maintenance and operations of fully commissioned accelerator subsystems of the LCLS project will be supported by Linac Operations funds.