LCLS Project	Baseline Change Request (BCR)	CR No. PM-38	Level: 0

ORIGINATOR:	Mark Reichanadter, Deputy Project Director, LCLS Project	PHONE: 650-926-8583	DATE: 23-Sep-07

CHANGE TITLE: Revised Cost and Schedule Baseline due to Effects of the FY 2007 Continuing Resolution (CR).

BCR JUSTIFICATION:
☑ Budget Addition ☐ Budget Reduction ☐ Budget Transfer ☐ Underestimated Budget ☐ Cost Growth
☐ Cost Reduction ☑ Schedule/Milestone Change ☐ Other _____

This BCR proposes a revision to the cost and schedule baseline of the Project. The proposed changes fulfill two purposes:(1)compensates the cost and schedule impacts of the FY 2007 CR and the subsequent reduction in 2007 funding on the LCLS Project and (2) updated Estimate-to-Complete, BAC, TPC. There is no change to the overall scope of the LCLS or its scientific performance. To better optimize the transition to operations, a transfer of budget/scope between the Project Office and E-Beam Systems in OPC is included.

IMPACTS (ESTIMATE THE IMPACTS OF IMPLEMENTING THE PROPOSED CHANGE):

Fund Types effected by this BCR: ☐ PED ☑ CON ☐ LLP ☑ R&D ☑ PreOps ☑ Spares

	1	2	3	
LCLS Major Systems	Actuals through June 2007	Baseline ETC	Increase to ETC	Budget at Complete (1 +2 +3)
Project Office (TEC Support)	$16,691	$2,399	$3,006	$22,095
E-Beam Systems	$77,095	$29,935	$9,459	$116,489
Photon Beam Systems	$21,272	$24,657	$2,969	$48,897
Conventional Facilities	$59,088	$69,342	$3,953	$132,383
Estimated Base Cost (TEC)	$174,145	$126,333	$19,386	$319,864
Contingency		$14,522	$17,614	$32,136
Total TEC		$315,000	$37,000	$352,000
Project Office (OPC Support)	$5,189	$15,327	-$4,913	$15,602
E-Beam Systems	$9,885	$14,242	$4,384	$28,511
Photon Beam Systems	$2,037	$8,679	$3,647	$14,362
Conventional Facilities	$0	$683	$841	$1,524
Estimated Base Cost (OPC)	$17,111	$38,930	$3,958	$59,999
Management Reserve		$7,959	$42	$8,001
Total OPC		$64,000	$4,000	$68,000
Estimated Base Cost (TPC)	$191,256	$165,263	$23,344	$379,863
Total Contingency/MR		$22,481	$17,656	$40,137
Total TPC		$379,000	$41,000	$420,000

WBS/WBS/Milestone Dictionary or Level 1-3 Milestones (any change to WBS, WBS Dictionary or Milestone Dates/Dictionary required? Please enter change here):

There are significant changes to L1, L2 and L3 milestones. See the 'PM-38 Executive Summary' which shows the updated milestones due to the CR and funding reduction.

SCHEDULE (any impact on critical path(s)? What about impacts to adjoining systems?):

There are significant changes to the overall resource-loaded schedule. Overall, the most significant change is in CD-4. The original CD-4 (Project Complete) was scheduled for March 2009. The revised cost and schedule CD-4 date is July 2010 (sixteen month delay). See supporting documentation in 'BCR Description'

TECHNICAL (any impact on the LCLS Parameters?):

There are no technical changes to the LCLS performance or parameters.

INTEGRATION (any impact on the global LCLS (controls, alignment, commissioning)? What about impacts to adjoining systems?)

There are no integration changes included in the revised cost and schedule baseline. There is a phased transition to LCLS operations, which is described in the 'BCR Description'.

Impact of NOT Approving or Delaying Approval of this Request:

This BCR, if not approved, would not allow the Project to deliver the full LCLS scope and technical capabilities on the current approved cost and schedule baseline. A delay in approving this BCR also has negative consequences as it introduces uncertainty in LCLS planning. Currently, the project is at its peak annual funding and operating at full capacity.

LCLS Project	Baseline Change Request (BCR)	CR No. PM-38	Level: 0

APPROVALS:

	NAME	SIGNATURE	DATE
LEVEL 0			
Secretarial Acquisition Executive (DOE Deputy Secretary)	C. Sell	See Note 1	
LEVEL 1			
Acquisition Executive (DOE Director of the Office of Science)	R. Orbach	Raymond C. Orbach	2/7/08
LEVEL 2			
DOE Federal Project Director	H. Lee	Hanley Lee	1/10/08
CCB3 MEMBERS (SIGNATURES AS REQUIRED)			
LEVEL 3			
Project Director	J. Galayda	Joel Galayda	1/20/08
Deputy Project Director	M. Reichanadter	for Joel Galayda	1/10/08
LEVEL 4			
E-Beam System Manager	D. Schultz	D. Schultz	1/10/08
Photon Beam System Manager	J. Arthur	J. Arthur	1-10-08
Conventional Facilities System Manager	D. Saenz	for D. Saenz	1/10/08
Associate Project Director for Civil Construction	J. Albino	Jess H. Albino	1/10/08
OTHER			
Control Account Manager (CAM)			
Cost & Schedule Manager	P.Mast	Patricia A. Mast	1-10-08
Finance Manager	W. Sisson	Wesley Sisson	1-10-08
ES&H Officer (if applicable)	M. Scharfenstein	N/A	
Procurement Officer (if applicable)	D. Pindroh	N/A	

Note 1: See attached Performance Baseline Change Request Approval Memo

The Deputy Secretary of Energy
Washington, DC 20585

January 24, 2008

MEMORANDUM FOR RAYMOND L. ORBACH
UNDER SECRETARY FOR SCIENCE

FROM: CLAY SELL

SUBJECT: Approval of the Project Performance Baseline Change Request for the Linac Coherent Light Source (LCLS) Project at the Stanford Linear Accelerator Center (SLAC)

Based on the recommendation of the Director, Office of Engineering and Construction Management (OECM), I approve your request for a performance baseline change for the Office of Science's LCLS project at SLAC as follows:

- Total Project Cost (TPC) – from $379M to $420M
- Project Completion Date (Critical Decision, CD-4) – from March 2009 to July 2010

OECM should conduct a follow-up review in the near future to ensure satisfactory completion of the External Independent Review (EIR) corrective actions.

Printed with soy ink on recycled paper

Baseline Change Request Description of the LCLS Project

November 2007

2575 Sand Hill Road • Mail Stop 103 • Menlo Park, CA 94025-7015
650-926-2288 • Fax 650-926-4695

SLAC is operated by Stanford University for the U.S. Department of Energy

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Linac Coherent Light Source – Baseline Change Request Description

This document provides an overview of Baseline Change Request (BCR) PM-38 for the LCLS Project. The BCR proposes a revised cost and schedule baseline, primarily in response to the effects of six months' funding uncertainties followed by a reduction in funding due to the FY07 continuing resolution (CR) appropriation. In addition to the CR effects, and in response to recommendations of the July 2007 DOE Office of Science Independent Project Review (IPR), this BCR includes updated cost and schedule estimates and increased contingency allowance to provide a high probability that the project's remaining commitments can be delivered on cost and on schedule. There is no change to the project's scope, capability or performance criteria.

SUMMARY DESCRIPTION: The LCLS is designed to provide laser-like radiation in the x-ray region of the spectrum that is 10 billion times greater in peak brightness than any existing coherent x-ray light source. This advance in brightness is similar to that of a synchrotron over a 1960's laboratory x-ray tube. Synchrotrons revolutionized science across disciplines ranging from atomic physics to structural biology. Advances from the LCLS are expected to be equally dramatic. The LCLS Project will provide the first demonstration of an X-FEL in the 1.5 - 15 Angstrom range and will apply these extraordinary, high-brightness x-rays to scientific problems. The LCLS experimental program will commence with: measurements of the x-ray beam characteristics and tests of the capabilities of x-ray optics; instrumentation; and techniques required for full exploitation of the scientific potential of the facility. This will be the world's first such facility.

CURRENT PROJECT STATUS:

• CD-0 (Approve Mission Need)	Planned: June '01	Actual: June '01
• CD-1 (Approve Preliminary Range)	Planned: Oct. '02	Actual: Oct. '02
• CD-2a (Approve LLP Budget)	Planned: May '03	Actual: July '03
• CD-2b (Approve Performance Baseline)	Planned: April '05	Actual: April '05
• CD-3a (Approve Start of LLP)	Planned: Dec. '04	Actual: Dec. '04
• CD-3b (Approve Start of Construction)	Planned: Feb. '06	Actual: March '06
• CD-4 (Approve Start of Operations)	Planned: March '09	Forecast: March '09
• Total Estimated Cost (TEC):	$ 315.0M	
• Other Project Cost (OPC):	$ 64.0M	
• Total Project Cost (TPC) :	$ 379.0M	
• TPC Percent Complete (June '07):	Planned: 60.1%	Actual 51.5%

APPROVED CD-2b FUNDING PROFILE*:

	FY02	FY03	FY04	FY05	FY06	FY07	FY08	FY09	Total
PED		5,925	7,456	19,914	2,518	161			35,974
Construction				29,760	82,170	105,740	51,356	10,000	279,026
OPC	1,500		2,000	4,000	3,500	16,000	15,500	21,500	64,000
Annual Total	1,500	5,925	9,456	53,674	88,188	121,901	66,856	31,500	379,000

* April 2005 CD-2b approved funding profile. Due to the FY07 CR, the Project's FY07 funding has been reduced to $101.0M Construction and $13.0M in OPC. LCLS has been directed by DOE to provide a revised baseline of the project's costs and schedule in order to deliver its commitments to DOE. This revised baseline has been presented for review to DOE SC IPR in July 2007.

BRIEF DESCRIPTION OF PROJECT SCOPE: The LCLS Project is constructed on the grounds of Stanford University at the Stanford Linear Accelerator Center (SLAC). LCLS has been designed such that future expansion on the existing site is possible. The LCLS project scope includes the following major systems:

1. Technical Systems:
   - **a.** A 135 MeV injector built at Sector 20 of the 30-sector SLAC linac to create the electron beam required for the X-FEL.
   - **b.** Modifications to the last one-third of the linac, including the addition of two magnetic bunch compressors. Most of the linac and its infrastructure remain unchanged.
   - **c.** The existing components in the Final Focus Test Beam tunnel have been removed and replaced by a Beam Transfer Hall (BTH).
   - **d.** An Undulator system, installed in a below-grade tunnel with associated equipment.
   - **e.** A Beam Dump where electron beam is separated from photons
   - **f.** Photon Systems including x-ray diagnostics, optics, and transport from Front End Enclosure (FEE) to Near Experimental Hall (NEH) and Far Experiment Hall (FEH).
2. Capital Facilities:
   - BTH above grade structure connecting the existing Linac to Undulator Hall
   - Undulator Hall underground tunnel
   - Electron Beam-Dump and Front End Enclosure underground facilities
   - The NEH facility constructed near the PEP Ring Road
   - X-Ray Transport underground tunnel from NEH to FEH
   - The FEH facility, an underground cavern, being constructed east of NEH
   - Renovation of two existing SLAC buildings to provide office space for operations staff when LCLS becomes operational.
3. Atomic, Molecular and Optical (AMO) Instrument:

The LCLS project will fabricate the Atomic, Molecular and Optical (AMO) physics instrument.

OVERVIEW OF THE REVISED BASELINE:

Due to the U.S. Congress FY07 Continuing Resolution (CR), DOE-Basic Energy Sciences (BES) informed LCLS Project management that FY07 funding has been reduced by $8M and that the funds will not be restored until FY09. BES directed LCLS management to prepare a revised schedule and cost baseline, and funding profile that delivers the Project technical baseline. The results, described below, are based on a comprehensive re-evaluation of the Project's cost, schedule, contingency and risks to the mission.

At the summary level, the key features of the proposed baseline change for the LCLS project can be summarized as follows:

- Changes to the Project Scope: There are no changes to the scope, capability or performance of the LCLS. The key performance parameters in the Project Execution Plan will be achieved.

- Funding Profile – A revised TEC and OPC funding profile for the LCLS Project is shown in Figure 1 below, with TEC cost and commitment profile in Figure 2. Adequate contingency is available on a year-by-year basis to address unplanned issues. The FY08 funding is fixed at the original baseline level therefore restoration of FY07 funding shortfall will not occur until FY09.

- Changes to Project Cost: The LCLS Project's Total Estimated Cost has been revised to $352.0M and Other Project Cost revised to $68M with a Total Project Cost of $420.0M. Figure 3 depicts the project budget at Work Breakdown Structure (WBS) Level 2.

- Changes to Project Schedule: Figures 4 and 5 list the revised level 1 and 2 milestones. For completion of the LCLS Project a revised date for achievement of the CD-4 milestone is proposed:

    - CD-4 (July 2010) – All capital facilities installed and commissioned as necessary to demonstrate detection of X-rays in the Near and Far Experimental Halls (NEH and FEH), and demonstrate a single-pulse x-ray with minimum spectral flux density of 10^6 photons/(mm^2 • 0.1%BW).

Figure 1 – LCLS Proposed TEC and OPC Funding Profiles

Linac Coherent Light Source Proposed Funding Profile (AYM$)						
	Costs to Date	FY07	FY08	FY09	FY10	Total
TEC Funding		101.16	51.36	36.50	15.24	352.00
Cum TEC Funding	147.74	248.90	300.26	336.76	352.00	
OPC Funding		13.00	15.50	17.00	11.50	68.00
Cum OPC Funding	11.00	24.00	39.50	56.50	68.00	
Total Funding		114.16	66.86	53.50	26.74	420.00
Cum Total Funding	158.74	272.90	339.76	393.26	420.00	

Figure 2 – LCLS Proposed TEC Funding, Commitment and Cost Profiles

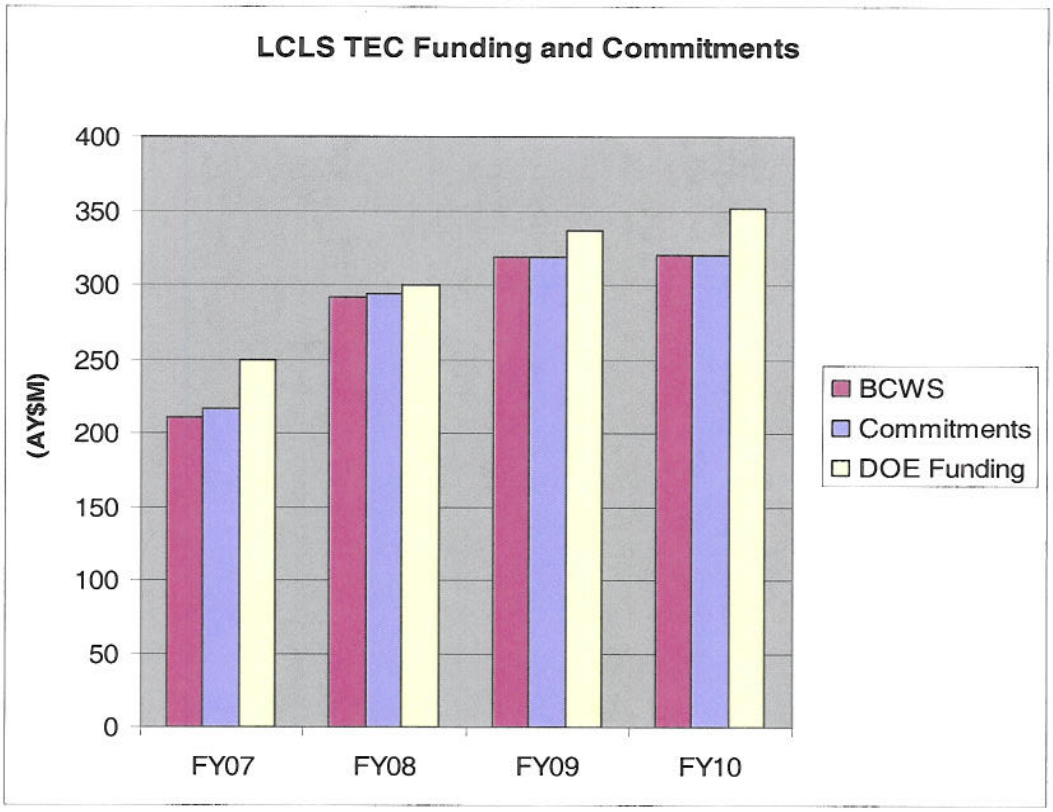


Figure 3 – LCLS Level 2 Cost Table

WBS	System	Budget ($M)
TEC		
1.1	Project Management	31.46
1.2	Injector System	23.87
1.3	Linac System	39.26
1.4	Undulator System	47.97
1.5	X-Ray Transport and Diagnostics	27.77
1.6	X-Ray Endstations	17.16
1.9	Conventional Facilities	132.38
	Total Base Budget	**319.86**
	Contingency	**32.14**
	TEC	**352.00**
OPC		
2.1	Project Management	25.44
2.2	Injector System	5.34
2.3	Linac System	3.43
2.4	Undulator System	10.60
2.5	X-Ray Transport and Diagnostics	3.52
2.6	X-Ray Endstations	10.15
2.9	Conventional Facilities	1.52
	Total Base Budget	**60.00**
	Management Reserve	**8.00**
	OPC	**68.00**
	Total Project Cost (TEC + OPC)	**420.00**

Figure 4 – LCLS Level 1 Milestones

Level 1 Milestones	Scheduled Date	Completion Date*
CD-0 Approve Mission Need	June 2001	June 2001(A)
CD-1 Approve Preliminary Baseline Range	October 2002	October 2002(A)
CD-2a Approve Long-Lead Procurement Budget	May 2003	July 2003(A)
CD-2b Approve Performance Baseline	April 2005	April 2005(A)
CD-3a Approve Start of Long-Lead Procurement	December 2004	December 2004(A)
CD-3b Approve Start of Construction	February 2006	March 2006(A)
CD-4 LCLS Project Complete – Start Full Ops	July 2010	

** (A) indicates actual milestone completion date*

Figure 5 – LCLS Level 2 Milestones

Level 2 Milestones	Scheduled Date*	Completion Date**
Prelim Safety Assessment (PSAD) Doc Complete	April 2004	April 2004(A)
DOE External Independent Review (EIR) Comp		June 2004(A)
Fire Hazard Analysis Approved	June 2005	August 2005(A)
Prelim Safety Assess (PSAD) Doc Approved	February 2006	February 2006(A)
Delivery of Undulator 1st Articles to MMF	July 2006	June 2006(A)
Sector 20/Alcove Beneficial Occupancy	July 2006	April 2006(A)
Research Yards Mods Beneficial Occupancy	October 2006	August 2006(A)
MMF Qual & Ready to Measure Prod Undulators	August 2006	August 2006(A)
Injector Laser Commissioning Review Complete	January 2007	December 2006(A)
Start Injector Commissioning (Drive Laser)	January 2007	January 2007(A)
Injector Accel Readiness Review (ARR) Comp	January 2007	March 2007(A)
Start Injector Commissioning (Beam on Cathode)	April 2007	April 2007(A)
Linac Water/Power Available	July 2007	March 2007(A)
Start Installation of Beam Transport Hall	February 2008	
Start Installation of Undulator Hall Facility	February 2008	
Linac (Li20 – Li30) Ready for Commissioning	February 2008	
Beam Transport Hall Beneficial Occupancy	April 2008	
Undulator Facility Beneficial Occupancy	April 2008	
Front End Enclosure Beneficial Occupancy	April 2008	
Near Experimental Hall Beneficial Occupancy	April 2008	
Central Utility Plant Beneficial Occupancy	April 2008	
X-Ray Transport Beneficial Occupancy	July 2008	
Far Experimental Hall Beneficial Occupancy	July 2008	
XT Start FEE Installation	August 2008	
Safety Analysis Document (SAD) Approved	August 2008	
Linac (Li20 – Li30) Commissioning Complete	September 2008	
Beam Path Project Close Out	September 2008	
XE Start Installation in NEH	February 2009	
LCLS ARR Complete (BTH thru FEH)	April 2009	
Start Linac-To-Undulator (LTU) Commissioning	April 2009	
2-D Detector Shipped to SLAC	May 2009	
XT Start Tunnel Installation	May 2009	
Start Undulator Commissioning (1st Light)	July 2009	
Start FEE Commissioning with Beam	July 2009	
Initiate Early Experimental Operations[1]	September 2009	
First X – Rays into NEH	September 2009	
XE Start Installation in FEH	September 2009	
First X – Rays into FEH	March 2010	

**Level 2 scheduled date includes ~2months float to the early finish milestones*

*** (A) indicates actual milestone completion date*

[1] *This level 2 milestone is approved by Director of the Office of Basic Energy Sciences.*

DEVELOPMENT OF REVISED BASELINE: To identify the root causes for the changes to the LCLS cost and schedule baseline, the project team adopted a methodical process in developing a revised baseline, as follows:

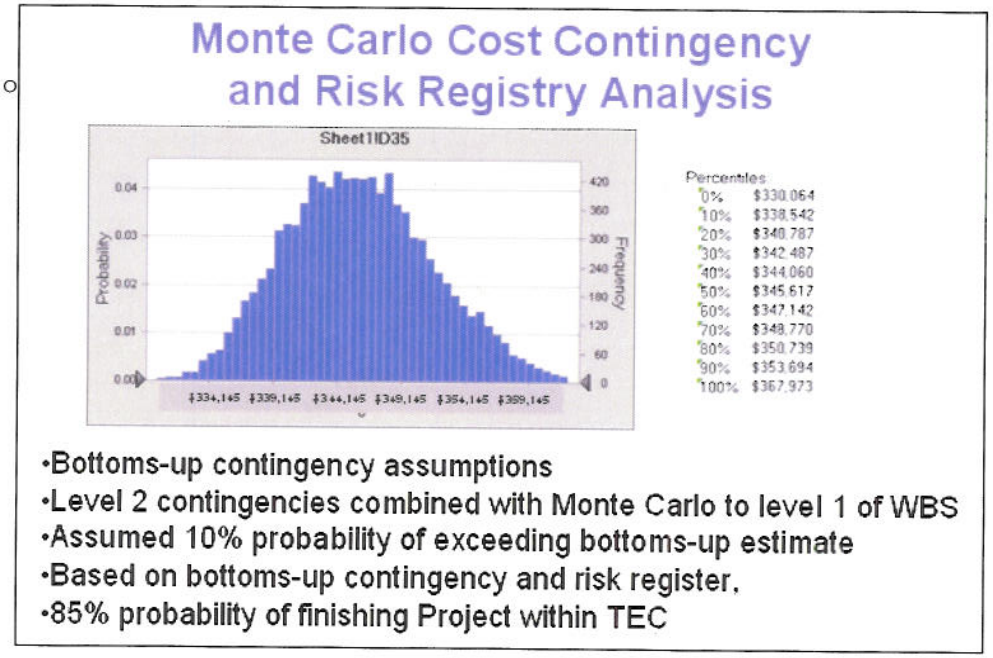
STEP 1 (Document Status against Baseline): Assess the current status of the project's earned value as of month-end June 2007. Actual costs to date (ACWP) and remaining work (ETC) for the approved baseline were documented.

STEP 2 (Revise baseline to address CR): Develop a Performance Measurement Baseline (PMB) for the remainder of the project, taking into consideration reduced FY07 funding and no changes to FY08 funding. TPC funding in FY09 and beyond was revised to deliver LCLS commitments to DOE in the earliest possible timeframe. The cost difference (STEP 2 – STEP 1) is related to the direct effect of the FY07 CR and FY09 funding restoration on the work to go after 6/30/2007.

STEP 3 (Update estimates): Update all cost and schedule estimates for work after 6/30/2007, based upon current best estimates. Update resource rates, escalation and indirect (G&A) rates. Optimize the transition to the LCLS operations phase based upon the current programmatic guidance from DOE-HEP and DOE-BES. The cost differences (STEP 3 – STEP 2) are due to re-estimating future work and optimizing the transition to LCLS operations.

STEP 4 (Reassess contingencies and risks on revised ETC): With the revised Performance Measurement Baseline (PMB) known, the project reassessed its contingency needs to address future uncertainties and known risks. Figure 6 shows the results of a Monte Carlo analysis of TEC contingency needs and a probabilistic determination of the known risks to the project. The results of the analysis provide an 85% confidence level that the project can be completed within TEC.

Figure 6 – LCLS Monte Carlo Cost Contingency and Risk Analysis



Summarizing the primary impact drivers to the BCR are shown below in Figure 7.

Figure 7 – Summary of BCR PM-38

Impact Cause		$AYK	Comments
CR-Related	Cost associated with extending schedule to address FY07 funding reduction	$21,277	This describes the cost to go (ETC) due to rescheduling work and captures the future effects of the FY07 CR.
	Uplanned (Actualized) Cost Due to CR and re-planning	$7,001	Recovery of drawn contingency to support unplanned activities related to the FY07 CR (replanning scenarios, revised cost and schedule baseline preparation and review, inefficiencies due to procurement delays and accelerations, standing army costs).
Reestimate cost and schedule for all remaining work		$2,067	This summarizes the reestimate of all remaining work (ETC). Updating the cost estimates, escalation rates, indirects, etc.
Increased Contingency Allowance		$10,655	This includes $10,615K contingency (TEC) and $40K management reserve (OPC). This allowance is necessary to provide a high confidence that the project can be delivered on schedule and within the TPC.
Total Impact		$41,000	Total TPC increase to the LCLS Project

Summary of BCR Impacts

- CR Effects – The cost and schedule impacts due to the CR can be summarized as unplanned (actualized) costs ($7.00M) and the extended schedule costs ($21.28M) to address the FY07 funding reduction. The total effect is ~$28.28M. Unplanned costs include delayed activities due to six months of funding uncertainty, procurement delays, reassessment of several mitigation actions/impacts and preparation/review of the revised baseline. Extended schedule costs are primarily driven by re-sequencing future activities to fit within the revised funding profile. This impacted the overall project schedule by sixteen months. Appendix 1 (Category "A") provides the basis of estimate at Level 3 to support the extended schedule costs. Appendix 2 provides the detailed basis to justify the unplanned (actualized) costs

- Updated Cost and Schedule Estimate – Effects unrelated to the CR include updating the cost and schedule estimates for all remaining work, updates to the project's escalation rates and indirect costs (G&A). The total cost impact of updating the cost and schedule estimate is ~2.07M. Appendix 1 (Category "B") provides the basis of estimate at Level 3 to support the updated cost estimate. The effects of escalation and indirect charges are small but can be summarized as follows:

    - Escalation – Labor escalation rates at SLAC and LLNL were increased from 2.6% per year to 4.0% per year, and the ANL rate increased from 2.6% per year to 4.5% per year. This is based upon accurate projections for near-term salary increases at the three partner laboratories. The total cost impact for the escalation increase is $1.003K.
    - Indirect costs (G&A) – SLAC's indirect charges were increased from 38% to 40% and TEC non-labor changed from 4.8% to 4.32% and OPC non-labor changed from 5.52% to

5.04%. These changes were based upon accurate reflection of SLAC indirect support of the LCLS Project. The total cost impact for the change in indirects is $151,407.

- Contingency (Management Reserve) – Contingency and management reserve allowances were reassessed on the project's remaining work. The basis for determining the TEC contingency was a bottoms-up contingency assessment and a probabilistic evaluation of the project's remaining risks. To provide an 85% probability for successful completion of the project, the contingency was found to be $32.14M. The approved project baseline has $14.52M contingency remaining. After restoring $7.0M contingency due to the unplanned costs of the CR unplanned costs, an additional $10.61M contingency is required to provide a high probability of successfully completing the project on this proposed baseline cost and schedule. $40K of management reserve was added to the project OPC. Summarizing, this baseline change request provides $32.14M of contingency or ~22.1% on remaining TEC work, and $8.00M or ~18.7% on remaining OPC work.

ADDITIONAL INFORMATION & ASSUMPTIONS CONTAINED IN THIS BCR:

- DOE O413.3A – The revised LCLS PMB is compliant with DOE O413.3A, *Project and Program 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 from the DOE complex.

- Project Execution Plan – The LCLS Project Execution Plan (PEP) was approved by DOE's Under Secretary for Science in April 2005. The PEP has been modified to reflect the proposed revision to the LCLS approved baseline. DOE Federal Project Director and LCLS Project Office will manage and control work at SLAC in accordance with the revised PEP. The revised PEP will be approved as part of approving the revised cost and schedule baseline.

- Work Breakdown Structure (WBS) – The Work Breakdown Structure has not been changed as a result of this BCR. There has been no change in technical baseline or the key performance parameters from this revised baseline.

- Cost, schedule, technical and programmatic assumptions used in preparing the revised baseline –
    - All revisions are compared to Actual Cost of Work Performed plus the original approved Estimate to Complete as of month-end June 2007.
    - Funding – Per guidance from DOE-BES, any changes to LCLS funding profile will not occur until FY09.
    - Cost and Schedule
        - All escalation and resource rate calculations are 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 are 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 LCLS Project Office. These are assigned fixed dates with 1 month float to the L4 milestone. Float between L4 and L3 is monitored monthly.
            - 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
  - Schedule Contingency –
    - Project milestone dates at levels 1, 2 and 3 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 a Monte Carlo critical path analysis, the schedule contingency provides >90% likelihood of achieving the project's performance goals before CD-4.
  - Scope Definition and Contingency – The LCLS Project Execution Plan (PEP) defines the Project scope in terms of Project performance goals and key performance parameters. 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 was performed at the lowest WBS level consistent with PMD 1.1-021 (Cost Estimating Procedure). This provides a risk-based comparison of potential contingency needs to available cost contingency.
    - The revised project baseline provides for $32.14M contingency funds on TEC, which is ~22.1% on cost to go. For OPC, $8M of management reserve provides ~18.7% on cost to go. Based on a Monte Carlo cost contingency analysis including bottoms-up contingency and known risks there is an 85% probability of

finishing the project with the TEC, which is considered adequate for the remainder of the project.

- Risk Management
  - LCLS risk management policies and procedures have not been affected by the Continuing Resolution. LCLS Risk Management Plan (RMP) 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. The LCLS RMP addresses risks over the entire scope and life cycle of the project. The possible financial impacts of these risks are estimated quantitatively and compared to available contingency in a statistical "Monte Carlo" 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 most 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. When installation is complete, 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 is a state of the art facility that will enable discovery-class experiments. This requires a transition to operations not typically used for a conventional facility. LCLS plans a phased transition into operations as each major subsystem achieves 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.

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched) Cost Increase ($)	Explanation	Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work Cost Increase ($)	Explanation	Proposed BAC	Variance
1.01.01 Environment, Safety & Health	1,712,631	656,658	1,117,973	This is the extension of ES&H labor resources due to the extended project timeline	-82,277	Change in resource rate	3,404,985	1,035,696
1.01.02 Project Management	12,966,622	1,615,312	3,572,152	This is the extension of project office labor resources due to the extended project timeline	-1,824,903	Reduction in the number of staff needed in the project office.	16,329,184	1,747,250
1.01.03 Technical Integration	1,994,446	127,073	568,650	This is the extension of integration resources due to the extended project timeline	-345,884	Design supervisor is not needed for the later portion of the project	2,344,286	222,767
1.01.04 Education Support	16,802	0	0		0		16,802	0
TEC Total	**16,690,501**	**2,399,043**	**5,258,775**		**-2,253,063**		**22,095,256**	**3,005,712**
2.01.01 Physics Support (OPC)	1,114,561	365,119	895,278	This is the extension of physics labor resources due to the extended project timeline	-1,260,397	Revise estimate of physicists' effort required for commissioning	1,114,561	-365,119
2.01.02 R&D Studies & Prototyping	51,409	0	0		0		51,409	0
2.01.03 Project Mgmnt, Planning and Admn - M&S (OPC)	4,023,212	14,271,044	-4,545,878	This is M&S, power and maintenance resources for OPC. There was a increase in this area due to additional M&S resources needed for an extended project timeline. The increase was offset by a transfer of budget and scope to E-Beam Systems to replan the commissioning effort for the extended project timeline.	-308,051	Change to resource rates. Also there was a reprogramming of resources from 2.1.3 to 2.2, 2.3 and 2.4 for OPC labor support.	13,440,327	-4,853,929
Transfer of Scope/Budget (Photon Commissioning) from Project Management to Photon Systems	-582,459	-996,084	0		0	0	-1,578,543	-1,578,543
OPC Total	**5,189,182**	**14,636,163**	**-3,650,600**		**-1,568,448**		**13,027,754**	**-6,797,591**
TPC Total	**21,879,683**	**17,035,206**	**1,608,175**		**-3,821,511**		**35,123,010**	**-3,791,879**

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched) Cost Increase ($)	Explanation	Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work Cost Increase ($)	Explanation	Proposed BAC	Variance
Injector System								
1.02.01 Injector System Management & Integration	4,642,207	0	0	N/A	0	N/A	4,642,207	0
1.02.04 Injector RF Subsystem	5,079,090	-1,405	0	NA	1405	Effort complete - close-out account	5,079,090	1,405
1.02.05 Injector Magnets & Supports	1,229,905	1,725	0	NA	-1725	Effort complete - close-out account	1,229,905	-1,725
1.02.06 Injector Vacuum & Supports	1,186,324	0	0	NA	0	N/A	1,186,324	0
1.02.07 Injector Diagnostics	2,446,378	0	0	NA	0	N/A	2,446,378	0
1.02.17 Injector Installation & Alignment	1,621,225	46,433	0	NA	-46433	Effort complete - close-out account	1,621,225	-46,433
TEC Total	**16,205,129**	**46,753**	**0**		**-46753**		**16,205,129**	**-46,753**
2.02.04 Injector RF Subsystem	709,506	116,048	375,854	Extended fixed costs for project due to longer schedule.	-269	N/A	1,201,140	375,586
2.02.05 Injector Magnets & Supports	0	0	0	N/A	0	N/A	0	0
2.02.07 Injector Diagnostics	0	0	0	N/A	0	N/A	0	0
2.02.08 Injector System Emittance Enhancement	59,421	741,343	-4,362	N/A	1,598	N/A	798,000	-2,764
OPC Total	**768,927**	**857,391**	**371,492**		**1,330**		**1,999,140**	**372,822**
Controls								
1.01.03 Technical Integration	8,286,004	1,150,832	384,533	Extended fixed costs for project due to longer schedule, extending management (LOE) to the new CD-4 Date	-458,047	Decrease in contract labor needs.	9,363,322	-73,514
1.02.02 Injector Controls Subsystem	3,598,336	95,676	1,914	Escalation due to CR	1,869	Escalation	3,697,795	3,783
1.03.02 Linac Controls & Power Conversion Subsyster	3,582,701	5,530,967	1,403,582	Extended fixed costs due to longer schedule, and labor premiums due to compressed schedule for BC2.	638,632	New scope added for timing system, networks, and PPS	11,155,881	2,042,213
1.03.06 Linac RF Subsystem	202,615	0	0	N/A	0	N/A	202,615	0
1.04.02 Controls	724,512	2,781,143	269,477	Extended fixed costs for project due to longer schedule at ANL	140,826	New scope for vacuum and timing system	3,915,958	410,303
TEC Total	**16,394,168**	**9,558,618**	**2,059,506**		**323,280**		**28,335,571**	**2,382,785**
2.01.01 Physics Support (OPC)	58,044	228,457	0	NA	-8,638	Costs moved to Commissioning area	277,863	-8,638
2.02.02 Injector Controls Subsystem	0	0	0	NA	15,439	Effort complete - close-out account	15,439	15,439
2.02.07 Injector Diagnostics	0	0	0	N/A	0	NA	0	0
2.03.02 Linac Controls & Power Conversion Subsyster	14,797	94,437	0	N/A	-280	N/A	108,954	-280
2.04.02 Controls	41,028	92,875	5,910	Escalation due to CR	-449	N/A	139,364	5,461
OPC Total	**113,869**	**415,769**	**5,910**		**6,072**		**541,620**	**11,982**
Linac System								
1.03.01 System Management & Integration	4,531,772	809,991	1,104,809	Extended fixed costs for project due to the longer schedule. Also, accelerated schedule to compensate for CR delays to deliver LTU and E-Beam Dump system integration for 2008 installation which included additional manpower to support these efforts and premium cost for materials. Plus 2007 cost escalation.	-216,936	Cost savings due to decreased efforts needed to support fabrication effort	6,229,636	887,873

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
1.03.03 Linac Magnets & Supports	1,139,627	1,227,289	351,153	Accelerated schedule to compensate for CR delays to deliver LTU and E-Beam Dump system integration for 2008 installation includes additional manpower to support these efforts and premium cost for materials. Plus 2007 cost escalation.	-62,766	Cost savings on LTU magnet stands	2,655,303	288,387
1.03.04 Linac Vacuum Subsystem	2,056,662	1,188,176	392,255	Accelerated schedule to compensate for CR delays to deliver LTU and E-Beam Dump system integration for 2008 installation includes additional manpower to support these efforts and premium cost for materials. Plus 2007 cost escalation.	-150,499	Cost reduction by eliminating vacuum processing and replace with hydrogen firing or vacuum firing components prior to installation	3,486,594	241,756
1.03.05 Linac Electron Diagnostics Summary	2,931,809	1,719,699	779,667	Accelerated schedule to compensate for CR delays to deliver LTU and E-Beam Dump system integration for 2008 installation includes additional manpower to support these efforts and premium cost for materials. Plus 2007 cost escalation.	-337,262	Design change of cold trap, replaced with fast valve to protect catastrophic failure from BSY, re-use OTRS1 for OTR30	5,093,913	442,405
1.03.06 Linac RF Subsystem	2,255,550	0	0	N/A	0	N/A	2,255,550	0
1.03.07 Linac Installation & Alignment	2,094,782	3,334,513	164,283	2007 cost escalation due to CR	2,583,980	Cost increase due to better estimate to complete using 2006 installation as a model	8,177,558	2,748,263
TEC Total	**15,010,202**	**8,279,668**	**2,792,168**		**1,816,516**		**27,898,554**	**4,608,684**
2.03.04 Linac Vacuum Subsystem	709,506	0	0	N/A	0	N/A	709,506	0
2.03.05 Linac Electron Diagnostics	0	0	0	N/A	0	N/A	0	0
2.03.06 Linac RF Subsystem	0	0	0	N/A	0	N/A	0	0
OPC Total	**709,506**	**0**	**0**		**0**		**709,506**	**0**
Undulator System								
1.04.01 Undulator System Management & Integration	7,419,085	392,764	942,418	Manpower in 1.4.1 TEC longer and added extra effort, travel and m&s to accelerate schedule due to CR	92,002	Extra resources required for quality control and documentation. Added extra effort, travel to stay on schedule	8,846,269	1,034,420
1.04.03 Undulator Magnet & Support	17,804,911	7,082,428	551,826	CR related extended fixed SLAC costs for project due to longer schedule for these areas	-137,465	Reorganized resulting in a net decrease	25,301,700	414,361
1.04.04 Vacuum System	1,713,793	1,829,857	423,535	Manpower in Vacuum System hours for effort in 07, from average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 70%.	-890,889	Redesign of vacuum chamber creates cost savings	3,076,296	-467,354
1.04.05 Diagnostics	2,502,413	1,735,689	211,251	The Diagnostic System has been impacted by unplanned work due to CR and re-planning, with a CR production inefficiency factor of 20% BPM, 90% BFW and 70% for BLM .	424,340	Diagnostic designs required much more work to meet specifications.Significantly more resources required for R&D and production of the BPM.	4,873,692	635,590

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
1.04.06 Undulator System Installation and Alignment	44,853	1,009,701	0	NA	897,045	Cost increase due to better estimate to complete, estimate based on 2006 installation experience, and rate change	1,951,599	897,045
TEC Total	**29,485,055**	**12,050,439**	**2,129,029**		**385,033**		**44,049,556**	**2,514,062**
2.04.01 Undulator System Management & Integration	367,440	1,443,831	343,036	CR effort replanning absorbed significant resources during TEC stage of project. The CR delayed entering the OPC stage of the project. Added extra effort, travel and m&s to stay on schedule.	88,539	Extra resources required for commissioning in FY09. Added extra effort, added extra travel.	2,242,846	431,575
2.04.03 Undulator Magnet & Support	69,026	1,905,719	0	NA	1,274,348	Costs for Undulator spares, appearing in FY09 to accommodate SLAC accounting practices.	3,249,093	1,274,348
2.04.04 Vacuum System	162,482	192,999	0	NA	-16,871	Costs for Undulator spares, appearing in FY09 to accommodate SLAC accounting practices.	338,610	-16,871
2.04.05 Undulator System Diagnostics [OPC]	125,791	138,655	0	NA	-9,139	Costs for Undulator spares, appearing in FY09 to accommodate SLAC accounting practices.	255,307	-9,139
2.04.06 Undulator System Commissioning	0	628,161	3,657,681	Replanned commissioning effort (transfer budget and scope from Project Management)	87,482		4,373,324	3,745,163
OPC Total	**724,739**	**4,309,365**	**4,000,717**		**1,424,359**		**10,459,180**	**5,425,076**

E-Beam Systems

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
Commissioning								
2.01.01 Physics Support (OPC)	4,446,087	4,078,769	0	NA	-220,203	Commissioning effort was restructured and reorganized to provide a smooth transition to operations. This resulted in a net cost decreasae when compared to cumulative costs of the previous commissioning costs	8,304,653	-220,203
2.02.02 Injector Controls Subsystem	1,194,037	341,101	0	NA	-341,101		1,194,037	-341,101
2.02.03 Injector Lasers	346,253	489,440	0	NA	-489,440		346,253	-489,440
2.02.17 Injector System Commissioning	562,401	836,981	0	NA	-307,044		1,092,338	-307,044
2.03.01 Linac System Mgmt & Integration	0	910,430	0	NA	-910,430		0	-910,430
2.03.02 Linac Controls & Power Conversion Subsyster	0	1,311,132	0	NA	-1,311,132		0	-1,311,132
2.03.07 Linac System Commissioning	436,928	691,546	2,153,096	Additional commissioning effort due to extended schedule	0		3,281,570	2,153,096
OPC Total	**6,985,706**	**8,659,399**	**2,153,096**		**-3,579,350**		**14,218,851**	**-1,426,254**
E-Beam Systems TEC Totals	**77,094,554**	**29,935,478**	**6,980,702**		**2,478,076**		**116,488,810**	**9,458,778**
E-Beam Systems OPC Totals	**9,302,747**	**14,241,924**	**6,531,215**		**-2,147,589**		**27,928,297**	**4,383,626**
E-Beam Systems TPC Totals	**86,397,301**	**44,177,402**	**13,511,917**		**330,487**		**144,417,107**	**13,842,404**

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
Controls								
1.05.02 Controls	1,297,196	822,492	328,967	Delay some work from FY07 to FY08 due to CR	764,312	Update work plan	3,212,967	1,093,279
1.06.02 XES Controls	474,559	5,916,983	1,493,296	Delay work from FY07 to FY09 due to CR	810,101	Update work plan	8,694,939	2,303,397
TEC Total	**1,771,755**	**6,739,475**	**1,822,263**		**1,574,414**		**11,907,906**	**3,396,676**
2.06.02 Controls Subsystem	0	645,771	368,491	Delay work from FY07 to FY09 due to CR	412,316	Update work plan, extend LBNL MOU	1,426,578	780,807
OPC Total	**0**	**645,771**	**368,491**		**412,316**		**1,426,578**	**780,807**
Lasers								
1.02.03 Injector Lasers	3,867,088	97,392	4,141	Delay of some work during FY07 due to CR	-607	Close out injector work	3,968,014	3,534
1.06.04 Laser Subsystem	0	1,388,210	152,039	Extension of work through FY09, FY10 due to CR	-569,480	Roll-off faster into Ops	970,770	-417,440
TEC Total	**3,867,088**	**1,485,602**	**156,181**		**-570,087**		**4,938,783**	**-413,907**
2.02.03 Injector Lasers	203,567	478,524	12,860	Delay some commissioning work during FY07 due to CR	-2,235	Close out injector work	692,716	10,625
OPC Total	**203,567**	**478,524**	**12,860**		**-2,235**		**692,716**	**10,625**
Commissioning								
2.01.01 Physics Support (OPC)	582,459	690,490	305,594	Extension of work due to CR	0	NA	1,578,543	305,594
2.06.01 XE System Mgmt & Integration	0	989,617	1,232,377	Extend commissioning work due to CR	-2,221,994	Reasignment of responsibility: move 1400k to 2.6.3, change CAM for the remainder	0	-989,617
2.06.03 Commissioning	0	688,661	0	NA	3,261,662	Consolidate commissioning	3,950,323	3,261,662
OPC Total	**0**	**1,678,278**	**1,232,377**		**1,039,668**		**5,528,866**	**2,577,639**
X-Ray Transport & Diagnostics								
1.05.01 System Management & Integration	4,379,145	779,785	1,275,060	Extension of XTOD work through FY09, FY10 due to CR	-795,870	Refine plan, move $593k to OPC 2.5.1	5,638,120	479,190
1.05.03 Mechanical & Vacuum Subsystem	1,159,625	2,501,617	224,917	Delay in FY07, extension into FY08 due to CR	-186,792	Refine plan	3,699,367	38,125
1.05.04 Optical Subsystem	3,736,024	3,967,126	148,560	Delay in FY07, extension into FY08 due to CR	-704,242	Refine plan, move $307k to OPC 2.5.4	7,147,468	-555,682
1.05.05 Diagnostics Subsystem	4,585,366	2,872,197	19,582	Delay in FY07, extension into FY08 due to CR	-299,548	Refine plan, move $60k to OPC 2.5.5	7,177,597	-279,966
1.05.06 X-Ray Transport System Installation & Alignment	0	883,649	12,589	Delay in FY07, extension into FY08, FY09 due to CR	-1,487	Refine plan	894,751	11,102
TEC Total	**13,860,160**	**11,004,374**	**1,680,708**		**-1,987,939**		**24,557,303**	**-307,231**

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
2.05.01 System Management & Integration	429,443	1,975,031	0	NA	-1,381,491	Move 1975k to 2.6.3, add 593k from 1.5.1	1,022,983	-1,381,491
2.05.04 Optical Subsystem	0	1,024,540	26,874	Delay in FY07, extension into FY08 due to CR	306,911	Transferred from 1.5.4	1,358,325	333,785
2.05.05 Diagnostics Subsystem	514,345	561,887	334,351	Delay in FY07, extension into FY08 due to CR	-274,574	Transferred from 1.5.5	1,136,009	59,777
OPC Total	**943,788**	**3,561,458**	**361,225**		**-1,349,154**		**3,517,317**	**-987,929**
X-Ray End Stations								
1.06.01 System Management & Integration	1,082,703	250,664	96,258	Extension of XES work through FY09, FY10 due to CR	-81,775	Revised management effort estimate	1,347,850	14,483
1.06.03 Mechanical/Vacuum Subsystem	0	0	0	NA	0	NA	0	0
1.06.05 X-Ray Detectors	147,331	172,389	68,955	Extend effort through FY09, FY10 due to CR	-122,000	Revised effort estimate	266,675	-53,045
1.06.06 System Installation & Alignment	392	1,113,273	3,699	Delay in FY07, extension into FY09 due to CR	343,829	Add cabling, refine plan	1,461,193	347,528
1.06.07 AMOS Experiment	481,354	3,054,535	-15,592	Exension of work due to CR, offset by correction of error in labor amount	55,810	Revised effort estimate	3,576,107	40,218
1.06.08 Crystals and Gratings	0	26,903	56	Escalation due to extension of work caused by CR	-132	Refine plan	26,827	-76
1.06.09 Mechanical Systems	60,764	809,498	15,081	Delay in FY07, extension into FY09 due to CR	-70,769	Revised effort estimate	814,574	-55,688
TEC Total	**1,772,544**	**5,427,262**	**168,457**		**124,963**		**7,493,226**	**293,420**
2.06.01 XE System Mgmt & Integration	0	0	0	NA	809,675	Reassignment of responsibility; new CAM	809,675	809,675
2.06.04 Spares	0	202,134	11,684	Escalation due to extension of work caused by CR	2,521	Refine plan	216,339	14,205
2.06.05 X-Ray Detectors	889,422	2,112,406	0	NA	747,656	Correction to account for Cornell billing delay at time of rebaselining	3,749,484	747,656
Transfer of Scope/Budget (Photon Commissioning) from Project Management to Photon Systems	582,459	996,084	0	NA		0	1,578,543	0
OPC Total	**1,471,881**	**3,310,624**	**11,684**		**1,559,852**		**6,354,041**	**1,571,536**
Photon Systems TEC Total	**21,271,547**	**24,656,713**	**3,827,608**		**-858,650**		**48,897,218**	**2,968,958**
Photon Systems OPC Total	**2,619,236**	**9,674,655**	**1,653,637**		**1,993,447**		**17,519,518**	**3,952,678**
Photon Systems TPC Total	**23,890,783**	**34,331,368**	**5,481,244**		**1,134,797**		**66,416,736**	**6,921,636**

Appendix 1
Detailed Reconciliation at WBS Level 3 Between the Current and Proposed Baselines

WBS	ACWP through June 2007	Baseline ETC	Category "A" Cost Impact of Schedule Change (extended fixed cost due to longer sched)		Category "B" Updated estimates due to lessons-learned, historic experience, better understanding of remaining work		Proposed BAC	Variance
			Cost Increase ($)	Explanation	Cost Increase ($)	Explanation		
1.09.01 System Management & Integration	17,304,294	6,588,156	977,073	Extended fixed costs for project due to longer schedule.	2,090,337	Revised cf staffing (incl consultants), tcco claims, 2nd shift tunnel safety oversight	26,959,860	3,067,410
1.09.02 Title 1 & Title 2 Conventional Facilities	5,689,636	4,454	0		0		5,694,090	0
1.09.03 Construction-T3 Conventional Facilities	36,094,480	62,749,086	0		889,565	Updated est.(bth switchboard, s21-30, bth west, feh) cors, icd for pps, fha. and Turner Change Orders	99,733,131	889,565
TEC Total	**59,088,410**	**69,341,696**	**973,073**		**2,979,902**		**132,383,081**	**3,952,975**
2.09.03 Beam Path Project Commissioning	0	682,657	393,798	Extended fixed costs for project due to longer schedule.	447,315	Revised cf staffing (incl consultants)	1,523,770	841,113
OPC Total	**0**	**682,657**	**393,798**		**447,315**		**1,523,770**	**841,113**
TPC Total	**59,088,410**	**70,024,353**	**1,366,871**		**3,427,217**		**133,906,851**	**4,794,088**

Appendix 2
Summary of Acualized Costs

FY 2007 CR Impacts (Actualized) to the LCLS Project					
System	Orginator	Date	Description	Estimated Cost	Notes
PM	Reich	November - February	Redirection of management staff due to funding uncertainty	$881,795	Uncertainty with one year CR (~Nov06-Feb07); all systems to operate at FY'06 level
PM	Reich	March-September	Preparation for Revised Baseline	2,938,266	Rebaseline preparation, IPR and EIR Prep - All systems affected
LN	Chan	October-March	Redirection of Mechanical Staff	$ 16,917	40% Eric's effort estimating different scenario
LN	Chan	October-March	Scale-back LTU design effort	$ 192,108	Uncertain with one yr CR LTU staff worked at reduced plan level, based on schedule slip
LN	Chan	March	Procurement delays due to design effort	$70,715	15% premium for supports ($471,450; Req. #11295) to deliver on schedule for 2008 installation
UN	Pile	January - February	Delays due to hold on funding to ANL	$1,391,705	3-4 months with lack of funding for Undulator System componets
UN	Pope	November - April	Delays in MMF due to hold on funding to ANL	$455,555	Affected hardware delivery schedule.
XT	McMahon	January - February	Delays due to hold on funding to LLNL	$1,054,354	Procurements delayed, uncertainty about plan
XES	Moeller			0	no impact
				$7,001,414	Actualized unplanned costs. Estimate of project contingency used to perform activities related to the CR.

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

CR Actualized Impact #1 (Nov15-Feb15)	LCLS management team working through possibility of a one year CR in ~15Nov. Funding situation understood on Feb 16. 3 month duration			
	Fraction	Resource Rate	CR Impact	
Project Director	20%	80,806	16,161	
Deputy Project Director	30%	80,806	24,242	
Associate Project Director-Eng	15%	80,806	12,121	Following the 2006 election, DOE-BES informed LCLS of
Associate Project Director-Civil Const	10%	80,806	8,081	the strong probability of a year-long Continuing
Finance Manager	30%	44,680	13,404	Resolution for FY07 (Planned funding $122M). Worst
PMCS Lead	40%	72,122	28,849	case scenario: a full year of FY06 funding (~$85M)
PMCS Team	25%	288,490	72,123	followed by the approved funding in FY08 (~$66M).
E-Beam System Manager	30%	52,772	15,832	Restoration would be provided in FY09 and beyond.
Photon Beam System Manager	30%	52,772	15,832	
Installation/Integration Manager	30%	52,771	15,831	Project team evaluated several reduced budget
Linac LOE (charge to Linac)	20%	7,848	1,570	scenarios, possible staffing reductions, cancelling
Undulator LOE-SLAC (charge to Undulator)	20%	205,036	41,007	shutdown work and prioritization of procurements over
Undulator LOE-ANL (charge to Undulator)	20%	713,395	142,679	four months. In late January 2007, LCLS stopped all non
XTOD LOE-LLNL (charge to XTOD)	20%	610,968	122,194	critical procurements to ensure it had sufficient funds to
XE LOE (charge to XE)	20%	456,593	91,319	honor its current commitments. In mid-February, LCLS
CF LOE (charge to CF)	20%	731,084	146,217	was informed funding would be reduced by ~$8M from
Physicist LOE (OPC) (charge to OPC)	20%	571,678	114,336	planned FY07 level. Additional iterations were needed to
Total for CR Impact #1			**881,795**	identify optimum go-forward plan.

PM-Sisson

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

CR Impacts #2 (Mar01-Jun30)	Preliminary bebaseline effort. Separate effort related to CR from the semi-annual Lehman status review (part of baseline). Mar1 -Jun30 4month duration.			
	Fraction	Resource Rate	CR Impact	
Project Director	30%	97,876	29,363	
Deputy Project Director	50%	97,876	48,938	
Associate Project Director-Eng	15%	97,876	14,681	
Associate Project Director-Civil Const	15%	97,876	14,681	
Finance Manager	30%	54,120	16,236	FY07 funding reduced ~$8M from baseline profile. LCLS
PMCS Lead	75%	82,204	61,653	project team immediately initiated its System Manager's
PMCS Team	75%	328,818	246,614	to award procurements and redeploy resources to
E-Beam System Manager	40%	63,920	25,568	execute its new strategy. Final iteration called for
Photon Beam System Manager	40%	63,920	25,568	deferring procurements in the XT and XE region until
Installation/Integration Manager	40%	63,920	25,568	FY09 and a two-phased commissioning strategy
Linac LOE (charge to Linac)	30%	8,436	2,531	(photons in the NEH) (photons in the FEH) for project
Undulator LOE-SLAC (charge to Undulator)	30%	220,414	66,124	completion.
Undulator LOE-ANL (charge to Undulator)	30%	736,525	220,958	
XTOD LOE-LLNL (charge to XTOD)	30%	656,790	197,037	Project team began preparations on its detailed
XE LOE (charge to XE)	30%	445,758	133,727	rebaseline plan, including a revised cost and schedule.
CF LOE (charge to CF)	30%	806,710	242,013	This preparation includes sufficient details to identify the
Physicist LOE (OPC) (charge to OPC)	10%	667,128	66,713	past and future costs of the continuing resolution and
Total			**1,437,973**	funding uncertainties.
CR Impacts #3 (Jul01-Oct30)	**Rebaseline effort and prep for EIR. Separate effort related to CR from the semi-annual**			
	Fraction	Resource Rate	CR Impact	
Project Director	30%	97,876	29,363	
Deputy Project Director	55%	97,876	53,832	
Associate Project Director-Eng	20%	97,876	19,575	
Associate Project Director-Civil Const	15%	97,876	14,681	
Finance Manager	30%	54,120	16,236	
PMCS Lead	75%	82,204	61,653	
PMCS Team	75%	328,818	246,614	
E-Beam System Manager	50%	63,920	31,960	
Photon Beam System Manager	50%	63,920	31,960	Subsequent to July Lehman review, LCLS project team
Installation/Integration Manager	50%	63,920	31,960	initiated a full evaluation of all remaininig work,
Linac LOE (charge to Linac)	30%	8,436	2,531	contingency and risks. Project team prepared a detailed
Undulator LOE-SLAC (charge to Undulator)	30%	220,414	66,124	rebaseline plan, including a revised cost and schedule.
Undulator LOE-ANL (charge to Undulator)	30%	736,525	220,958	This preparation includes sufficient details to identify the
XTOD LOE-LLNL (charge to XTOD)	30%	656,790	197,037	past and future costs of the continuing resolution and
XE LOE (charge to XE)	30%	445,758	133,727	funding uncertainties, and presented the revised
CF LOE (charge to CF)	30%	806,710	242,013	baseline to an External Independent Review (EIR)
Physicist LOE (OPC) (charge to OPC)	15%	667,128	100,069	reporting to the DOE Office of Engineerinng &
Total			**1,500,293**	Construction Management.

LN-Chan

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

				Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07			CR non-productive	months slip	
1.03.01.01.06	LTU System Integration	Fox,Kay E.	Mechanical Designer	216.00	202.00	154.00	205.00	186.00	107.50	1,070.50				
		Franklin,Joseph W.	Mechanical Designer	57.00	94.00					151.00				
		Montagne,Timothy M.	Engineer-Mechanical	93.60	110.40	83.20	139.20	128.00	136.00	690.40				
		Palrang,Michael T.	Science & Engineering Assoc	62.40	55.90	15.60				133.90				
		Schafer,Donald William	Science & Engineering Assoc	67.20	135.20	79.20				281.60	2,327.40	0.5	3	1163.7
1.03.03.05	LTU Quad	Franklin,Joseph W.	Mechanical Designer				80.00	144.00	84.00	308.00				
		Palrang,Michael T.	Science & Engineering Assoc				14.82	4.26	43.61	62.69				
		Schafer,Donald William	Science & Engineering Assoc			14.40	152.00	152.00	156.80	475.20	845.89	0.33	2	279.1437
1.03.04.05	Linac to Undulator (LTU) Vacuum System	Franklin,Joseph W.	Mechanical Designer						24.00	24.00	24.00	0.33	2	7.92
1.03.05.05	Profile Monitors (5ea)	Franklin,Joseph W.	Mechanical Designer			41.00	21.00		64.00	126.00	126.00	1	6	126
1.03.05.07	Bunch Length Monitors (4ea)	Palrang,Michael T.	Science & Engineering Assoc			36.20	111.38	94.74		242.32	242.32	1	6	242.32
										0.00				1819.0837
										0.5	productivity			
										0				
										86	Rate /hr			$ 86.00
										$ -				$ 156,441.20
1.03.04.05	Linac to Undulator (LTU) Vacuum System	Design Visionaries Inc					$ 4,227.50	$31,439.25						
										Past CR Labor cost				$ 192,107.95
				Oct-06	Nov-06	Dec-06	Jan-07	Feb-07	Mar-07					
	Linac Management	Bong,Eric L.	Engineer-Mechanical	84.00	76.00	60.00	168.00			388.00				
										0.4	CR			
										155.2				
										109	rate /hr			
										$ 16,916.80				
		Comments	estimated cost	15% expediting fee										
	LUT Support stands	Out for quote	417450	$70,715										

back up notes and e-mail
V:\LCLS\Users\JQChan\2007
Continue Resolution

UN-Pile

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

WBS#	CR Impact Cost	
1.4.1	$530,180	Undulator System Management & Integration
1.4.2		Controls
1.4.3	$244,545	Undulator Magnet & Support
1.4.4	$450,870	Vacuum System
1.4.5	$166,110	Diagnostics
1.4.6		Undulator System Installation and Alignment
Totals	**$1,391,705**	

The effects of the Continuing Resolution of FY07 May 1, 2007

The FY07 Technical Addendum to ANL MOU states that ANL will receive ~ $15M.
September 06 - Advanced payment of $2M for FY07 undulator assemblies

Oct 07 – ANL uses carry over funds -CR is an issue but Vacuum and Support Mover Systems could do with more R&D and Production Engineering

Stainless Vs Aluminum Vac chamber effort created – (was good strategy to confirm processes before production)
January 07 - CR Now becomes a major issue

Mid-January -Enough funding left for 6 weeks of effort only. Put all procurements on hold. Planned core team disaster scenario.

February 07 - Received additional $2M 2/6/07. We prioritized procurements – zero funded >$50K procurements for vendor responses. We planned to release only low value long lead items but had "commitments" issue.

March 07 - Received additional $2M 3/16/07 so we released low value long lead items

March 07 - Received $6m end of March 07

April 07 – routing funded requisitions for re-approvals
May 07 - Remaining $3M will be required as soon as Support Mover contract and Vacuum requisitions have been placed. (SM vendor evaluations are in progress at ANL – Vac system component orders are being processed now)

Undulator System Management and Integration

Past inefficiencies due to CR.

During the period from October 06 to April 07 the ANL/LCLS management account accrued 7574 hours.

Due to insufficient funds to procure any large value Undulator items (funds became available in late March 07), a significant amount of non-production related management, time was spent re-organizing the effort, cost and schedules while waiting.

Two examples of re-directed effort due to lack of funds are described below, one describes re-planning technical systems and the other describes a complete effort re-plan.

UN-Pile

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

In October 06 an alternate Vacuum System Strategy was deployed. The plan goals were to keep the team together and evaluate the pros and cons of Stainless V's Aluminum chamber designs. An evaluation plan was specifically created to help mitigate risks and improve quality of manufacture. A decision to go forward with the Stainless design was made in early March 07. Even though the work was worthwhile it was not in the original plan.

In December 06, a financial "disaster scenario" was envisaged for ANL and all hands (management staff) worked on total re-plan of the cost and schedules associated with keeping only six key FTE's for the rest of the year.

The estimate for the cost associated with dealing with CR related effects has been calculated by taking the total management effort hours from October 06 to April 07, creating an average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 70% (the amount of time associated with dealing with CR related issues)

7574 hrs x $100/hr x 0.7 = $530180

Magnets and supports

Pre CR Undulator procurements unaffected – see CROB vs. ETC PDF schedules. They include the Undulator Assemblies and the Quad magnets.

The estimate for the cost associated with dealing with CR related effects on the Support Mover System has been calculated by taking the total Magnets and Supports hours for effort from October 06 to April 07, creating an average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 35% (70% of 50%).

6987 hrs x $100/hr x .35 = $244545

Vacuum

Due to the CR no large value procurements were issued until late April 07. This includes chamber materials (stainless steel), vacuum chamber support system, the chamber machining contract and bellows procurement. The vacuum system will be six months late.

The estimate for the cost associated with dealing with CR related effects on the Vacuum System has been calculated by taking the total Vacuum System hours for effort from October 06 to April 07, creating an average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 70%.

6441hrs X $100 X 0.7 = $450870

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

Diagnostics
BFW

The estimate for the cost associated with dealing with CR related effects on the Beam Finder Wire has been calculated by taking the total hours for effort from October 06 to April 07, creating an average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 90% of the amount of time associated with dealing with CR related issues.

829hrs x $100/hrs x 0.9 = $74610

BPM

The estimate for the cost associated with dealing with CR related effects on the Beam Position Monitor has been calculated by taking the total hours for effort from October 06 to April 07, creating an average FTE hourly rate of $100/hr and multiplying it by a production inefficiency factor of 20% of the amount of time associated with dealing with CR related issues. Current BPM cost and schedule deficiencies are mostly due to the difficulties associated with design and NOT the CR. If we had had money within the project we would have redirected additional effort to help out with technical problems. For this reason an estimate of 20% inefficiency is allocated to CR.

4575hrs x $100 x 0.2 = $91500

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

- MMF delays (past and continuing)
  - Based on ANL hardware delivery issues causing delays in MMF performance. Selected durations from Zack's FAC presentation.
  - Past ED&I - $300k = 4 months * 5 FTE * $15k/FTE/month
  - Past M&S - $25k = $10k for mu-metal modification + $15k shim fabrication

- Serial to parallel assembly and installation (now and future)
  - Past ED&I: Inefficiency in performing value added work - $130.5k = 3 months * 2.9 FTE (Robert (20%), Catherine (20%), Ben (50%), Ed (50%), Nick (50%), Franz (50%), Georg (50%))* $15k/FTE/month

Total	455.5

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

WBS #	TASK	Personnel Costs (Man-Months)												Material Budget	TOTAL	
ALL ENTRIES BELOW SUMMARIZE THE CURRENT SCHEDULE/COST SLIP FOR EACH AREA DUE TO THE CR		Phys-M	Phys	EE	ME-M	ME	DES	Tech	Proc	Cntrl / Prog	Safety	Post-Doc	Admin		6,712,583	
															1,054,354	THESE COSTS ARE ALREADY INCURRED (ACTUALS)
1.05.02.0X	Controls			0.5			0.5			0.5					41,250	Delay in progress due to CR/procurement delays; need to hire more design staff to make up schedule
															0	
1.05.04.02.01 (new?)	Fast Valve														0	
	Delay in Final Design						0.5								10,417	Eng/Interface resource not avaiilable during to CR
															0	
1.05.04.02.02	Fixed Mask														0	
	Delay in FDR, Procurement						2.0								41,667	2 mo
	Cost inc													$2,000	2,000	
															0	
1.05.04.02.03	Slit														0	
	Delay in FDR, Procurement					2.0	2.0								95,000	2 mo
															0	
1.05.04.02.05	Gas & Solid Attenuator														0	
	Delay in FDR, Procurement			1.0		2.0	1.0								104,167	2 mo
	Cost inc													$0	0	Cost inc due to proce increases - Do prior to May 15, 2207
															0	
1.05.04.02.06	TTF Damage														0	
	No Impact														0	
															0	
1.05.04.02.07	Low Energy Mirror System														0	
	Delay in SCR		2.0			4.0	2.0								206,667	Staff and LCLS management unavailable (2 mo); Eng transition
															0	
1.05.04.02.07	High Energy Mirror System														0	
	No Impact														0	
															0	
1.05.05.02.01	Wave Model														0	
	n/a														0	
															0	
1.05.05.02.02	Monte Carlo Model														0	
	n/a														0	
															0	
1.05.05.03.01	Direct Imager														0	
	Delay in procurements			2.0						1.0					91,667	
															0	
1.05.05.03.02	Indirect Imager														0	
	n/a														0	
															0	
1.05.05.03.06 (rename)	Gas Detector														0	
	Delays in procurements for prototype,		1.0	1.0		1.0	1.0	1.0	0.3				0.1		135,104	More effort (premium) required to make same test date
															0	
1.05.05.04.04 (rename)	Low Energy Spectrometer														0	

Appendix 2
LCLS Actualized Cost Impacts due to FY07 CR and Funding Uncertainties

WBS #	TASK	Personnel Costs (Man-Months)												Material Budget	TOTAL	
ALL ENTRIES BELOW SUMMARIZE THE CURRENT SCHEDULE/COST SLIP FOR EACH AREA DUE TO THE CR		Phys-M	Phys	EE	ME-M	ME	DES	Tech	Proc	Cntrl / Prog	Safety	Post-Doc	Admin		6,712,583	
	Delay in progress to SCR						0.5								10,417	PI not available due to CR activities, System sicientist (Jacek, Dmitri, Mike P.)
															0	
1.05.05.04.05	K-Measurement System														0	
	Delay in progress to SCR		0.0				0.0								0	
															0	
1.05.05.04.02	Total Energy Measurement														0	
	Delays in procurements for prototype		2.0	2.0								2.0			148,333	Delay in laser & lightbox procurements
															0	
1.05.03.01	Vacuum Systems Engineering														0	
	Configuration Drawing Re-direction						2.0								41,667	Not included in Management section, Configuration re-works for CR
															0	
															0	
1.05.03.02	FEE Mech & Vac														0	
	Delay in progress to SCR						1.0								20,833	Eng Resiource unavailable due to CR, designer idle/inefficient
															0	
1.05.03.03.01 (rename)	NEH Mech & Vac														0	
	Delay in progress to SCR						1.0								20,833	Eng Resiource unavailable due to CR, designer idle/inefficient
															0	
1.05.03.04	Tunnel														0	
	Tunnel Procurements push to '08 or '09, Procurement delayed -> atypical price icreases													$8,000	8,000	15% on $51K (Atypical price escalation); Procurement \s pushed out
															0	
1.05.03.05.01	FEH Mech & Vac														0	
	Procurement delayed -> atypical price icreases													$13,000	13,000	15% on $85K (Atypical price escalation); Procurement \s pushed out
															0	
1.05.05.03.08 (new)	FEH Imager														0	
	deleted - no impact														0	
															0	
2.05.05.02	Modelling														0	
	Delays/re-direction in progress on modeling due to CR uncertainties									2.0					63,333	2*2m-m

List of Acronyms

ACWP	Actual Cost Work Package
AMO	Atomic, Molecular and Optical
ANL	Argonne National Laboratory
ARR	Accelerator Readiness Review
AYM$	Actual Year Million Dollars
BCR	Baseline Change Request
BCWS	Budget Cost of Work Scheduled
BES	Basic Energy Science
BTH	Beam Transport Hall
BW	Bandwidth
CAM	Control Account Manager
CD	Critical Decision
CR	Continuing Resolution
DOE	Department of Energy
EIR	External Independent Review
ETC	Estimate-to-Complete
FEE	Front End Enclosure
FEH	Far Experiment Hall
FY07	Fiscal Year 2007
G&A	General and Administrative
HEP	High Energy Physics
IPR	Internal Project Review
LCLS	Linac Coherent Light Source
LLNL	Lawrence Livermore National Laboratory
LLP	Long Lead Procurement
LTU	Linac-to-Undulator
MeV	Mega-Electron-Volt
MMF	Magnetic Measurement Facility
NEH	Near Experimental Hall
OPC	Other Project Cost
PEP	Positron Electron Project
PEP	Project Execution Plan
PM	Project Management
PMB	Performance Measurement Baseline
PMD	Project Management Document
PSAD	Preliminary Safety Assessment Document
RMP	Risk Management Plan
SLAC	Stanford Linear Accelerator Center
TEC	Total Estimated Cost
TPC	Total Project Cost
WBS	Work Breakdown Structure
X-FEL	X-Ray Free Electron Laser

Department of Energy
Washington, DC 20585

JAN 31 2008

MEMORANDUM FOR UNDER SECRETARY FOR SCIENCE

FROM: HARRIET KUNG /Harriet Kung
OFFICE OF BASIC ENERGY SCIENCES
DIRECTOR (ACTING)

SUBJECT: **ACTION**: Approve by signature a Baseline Change Request to increase the Total Project Cost and extend the schedule for the Linac Coherent Light Source Project at the Stanford Linear Accelerator Center, Menlo Park, CA.

ISSUE: The Baseline Change Request form must be signed by the project's Acquisition Executive.

BACKGROUND: The Total Project Cost (TPC) for the line item Linac Coherent Light Source (LCLS) Project has increased by $41M ($379M to $420M) and the project completion date has been delayed from March 2009 to July 2010. Approval by the Deputy Secretary, as the Secretarial Acquisition Executive, was required because the Linac Coherent Light Source project will experience a performance baseline deviation (greater than $25M or delay of six months or greater from the original project completion date). Based on the recommendation of the Office of Engineering and Construction Management (OECM) at the December 12, 2007 pre-ESAAB, the Deputy Secretary has approved your request for a performance baseline change by a memorandum to you dated January 24, 2008. This approval memorandum has been attached to the Baseline Change Request in lieu of his signature on the BCR Form.

RECOMMENDATION: Indicate your approval of this Baseline Change Request, by signing the attached form.

Attachment: Approval Memorandum from Clay Sell (dated January 24, 2008)

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