LCLS Risk Registry
September 2007

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															Best Case	Most Likely	Worst Case	
1.1	**Management**																	
R1.1-020	Contingency Analysis	The project does not have a clear understanding of its contingency needs for the remainder of the project … then there is the potential for committing to too much (or not enough) scope.	Mark Reichanadter	9/7/2007	Significant technical risk >$5M but <$10M L1M delay >3mo	25%	High	$10,000	Mitigate	$80	1. Perform a semi-annual bottoms-up risk-based contingency analysis on remaining work (T. Mast) 2. Perform a Monte-Carlo assessment annually to validate the bottoms-up contingency analysis (T. Mast). 3. Perform monthly assessment of Estimate at Complete (M. Reichanadter). 4. Perform monthly assessment of contingency on 'commitments to go' after reserving adequate contingency for scope under contract.	Small technical risk >$100K but <$1M Negligible schedule risk	2%	Low	0	250	1,000	
R1.1-021	Control Account Mischarges leading to Variances	The project control accounts are not regularly monitored … then there is the potential for mischarges which lead to erroneous variances.	System Managers (Schultz; Reichanadter; Saenz; Arthur)	9/7/2007	Significant technical risk >$5M but <$10M L2M delay >3mo, L1M delay <1mo	75%	High	$10,000	Mitigate	$0	• Establish procedures to close control accounts - January 2007. • Establish Hammer Tool to track budget vs actuals – January 2007.	Significant technical risk >$1M but <$5M Negligible schedule risk	25%	Medium	1,000	2,500	5,000	
R-1.1-023	Deputy Controls Manager	If LCLS Controls manpower needs cannot be filled in a timely manner … then personnel overload will lead to poor documentation and delays.	Dave Schultz	9/4/2007	Marginal technical risk >$100k but <$1M L3M delay <3mo	25%	Low	$200	Mitigate	$0	• Weekly communication with Controls Manager on resource loading, transfer of some responsibility to technical leads. DONE • Bring in a manager to cover controls in X-ray Systems. - DONE	Marginal technical risk >$100k but <$1M L3M delay <3mo	<10%	Low	0	0	200	
R-1.1-024	FY08 TEC Budget Authority	If LCLS requires larger than estimated contingency usage in FY08 … then critical FY08 planned procurements may need to be deferred.	Mark Reichanadter	9/7/2007	Minimal technical risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo	75%	Medium	$1,000	Mitigate	$60	• Track on a monthly basis (actuals + ETC) to ensure sufficient budget authority remains to complete critical FY08 tasks. • Develop a contingency management plan to handle procurements should additional funding be needed for critical FY08 activities.	Minimal technical risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo	30%	Medium	0	250	500	
R1.1-025	SSO Prior Approval of Bids & Contracts >$100K	From 6/25/07 through 12/31/07 the DOE SSO is requiring prior approval on that all RFP's, IFB's, RFQ's, and subsequent contract awards >$100K resulting in bidding and awarding delays from 6-10 days.	David Pindroh	9/7/2007	Minimal technical risk >$1,000 but <$1M Varies by procurement	15%	Low	$1,000	Mitigate	$0	1. Perform extensive and timely internal LCLS review of all bid and award packages prior to submittal to SSO. 2. Alert LCLS requesting staff of additional time delays. 3. Provide SSO with advance notification of "critical" pending reviews. 4. Establish a log to of all SSO-reviewed procurement and track status and through-put time for internal reviews and SSO. *NOTE: Procurement system approval will occur January 1, 2008 at which point this risk will be resolved.*	Minimal technical risk >$1,000 but <$1M Varies by procurement	10%	Low	0	0	0	
R1.1-026	Installation Schedule	If the major installation period beginning December 2007, is not well integrated throughout the project and Early Occupancy dates are not realized … then there is a risk of not meeting the start of commissioning milestones	R.M Boyce	9/5/2007	Significant schedule risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo	75%	Medium	$1,000	Mitigate	$0	1. Establish planning meetings to develop and integrate installation & checkout tasks at systems levels - Oct 15, 2007. 2. Hold twice monthly meetings between CF/TCCo/LCLS to clearly define EO parameters and dates; define type of work to be allowed by LCLS during EO installations - start in September 2007	Significant schedule risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo	25%	Low	100	500	1,000	
R1.1-027	Safety Incident or Accident	IF a safety incident or accident occurs that requires a stand-down of work activities, THEN additional cost and possible schedule delays could occur.	Mark Reichanadter	9/14/2007	Significant schedule risk >$1M but <$10M L2M delay >3mo, L1M delay <1mo	5%	High	$10,000	Mitigate	$0	• Implement LCLS ISM plan including work authorization processes and approvals • Conduct contractor toolbox/tailgate meetings • Review staff and contractor JSA prior to engaging in activities • Utilize UTR and other SME from SLAC matrix organization as necessary • Review lessons learned at the completion of major activities	Significant schedule risk >$1M but <$10M L2M delay >3mo, L1M delay <1mo	<1%	High	0	0	10,000	

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R1.1-028	Owner-Directed Changes to LCLS Conventional Facilities	IF there are excessive owner-directed changes to the LCLS conventional facilities, THEN there could be cost and schedule impacts to the project.	Mark Reichanadter	9/14/2007	Significant technical risk (to LUSI) >$100K but <$5M L2M delay >3mo, L1M delay <1mo	15%	High	$5,000	Mitigate	$0	• Implement weekly walk-arounds by LCLS CF staff, LCLS System Managers, and LUSI Staff • Include LCLS System Managers and LUSI Staff in the review and approval of trade contractor shope drawings	Marginal schedule risk >$100K but <$1M L2M delay <1mo	30%	Low	0	500	1,000	
1.2	**Injector System**																	
1.3	**Linac System**																	
R-1.3-007	Emiittance measurement upstream of BC2	IF Sector 28 wire scan emittance measurement does not provide adequate understanding of wake field effects in L2 THEN wire scanners will have to be installed in sector 24 before undulator commissioning in 2009.	Dave Schultz	9/15/2007	Significant schedule risk >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~30%	Medium	$250	Accept	$0	1 - perform emittance studies during the 2008 commissioning, 2 - reevaluate risk June, 2008	Significant schedule risk >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~30%	Medium	0	0	250	
R-1.3-008	Linac Stripline BPM sensitivity	IF the old linac stripline BPM electronics performance is insufficient to support LCLS commissioning THEN they must be replaced by new-design electronics used in the injector and LTU	Dave Schultz	9/15/2007	Significant schedule risk >$100K but <$1M L3M delay >3mo, L2M delay <3mo	unlikely - ~20%	Medium	$800	Accept	$0	1-install coaxial signal cables for linac BMP electronics during 2007 shutdown (done) . 2 - reevaluate risk March, 2008	Significant schedule risk >$100K but <$1M L3M delay >3mo, L2M delay <3mo	unlikely - ~20%	Medium	0	0	800	
1.4	**Undulator System**																	
R1.4-025	Vacuum Chamber Development Schedule	IF the undulator vacuum chamber does not meet specification … then an alternate, back-up, chamber will have to be developed with a subsequent delay the turn on for the beam through the complete undulator system.	Dave Schultz	9/4/2007	Marginal technical risk >$100k but <$1M L3M delay >3mo	25%	Medium	$500	Mitigate	$150	Parallel effort of alternate designs, • Downselect vacuum chamber design 9-30-08, FDR & SOW Oct. 08, evaluate first articles (December 08)	Marginal technical risk >$100k but <$1M L3M delay >3mo	10%	Low	0	200	500	
R1.4-026	RF BPM Schedule	If the schedule for the rf bpms cannot be improved … then the rf bpms will delay the assembly in the MMF and subsequently delay the turn on for the beam through the complete undulator system.	Dave Schultz	9/4/2007	Marginal technical risk >$100k but <$1M L3M delay >3mo	25%	Medium	$500	Mitigate	$0	• 3-BPM test (May 2007) • Review risk again in detail (June 2007), SOW Sept. 07, evaluate first articles (December 08)	Marginal technical risk >$100k but <$1M L3M delay >3mo	10%	Low	0	200	500	
R1.4-027	Undulator Component Deliveries	If components delivered to SLAC need rework or modification … then there will be delay in system assembly and subsequently delay in undulator system commissioning.	Dave Schultz	9/4/2007	Marginal technical risk >$100k but <$1M L3M delay >3mo	25%	Medium	$500	Mitigate	$0	• Communicate updates to designs and plans weekly, periodic Undulator group meetings to discuss status	Marginal technical risk >$100k but <$1M L3M delay >3mo	10%	Low	0	200	500	
1.5	**X-Ray, Transport, Optics & Diagnostics System**																	
R-1.5-006	Late changes to design due to evolving user requirements	If there are major changes in the scope, performance, existence or placement of XTOD instrumentation due to evolving user requirements…Then, it will be difficult to meet the schedule and budget as specified in P3.	John Arthur	9/12/2007	Moderate technical risk, cost risk <$100K, moderate schedule risk, L2M delay<3 months	25%	Medium	$100	Mitigate	$0	1) Adhere to BCR process. 2) Participate in Experimental Area design process 3) Formalize XTOD-LUSI interfaces with ICD by July 2007 4) Develop computer beam and instrumentation tools to allow accurate assessment of proposed changes.	Low technical risk, cost risk <$50K, low schedule risk, L2M delay <1 month	10%	Low	0	25	50	

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R-1.5-013	Mirror procurement delay	IF there are major delays or difficulties with procuring x-ray mirrors that meet technical requirements … THEN mirror installation may be delayed and/or mirror cost may rise.	J. Arthur	9/12/2007	Moderate technical risk, cost risk <$200K, high schedule risk, L2M delay < 6 months	50%	Medium	$200	Mitigate	$10	1) Develop mirror specs, begin discussions with vendors early. 2) Evaluate specs at SCR's Spring 2007 3) Procure mirrors with sufficient schedule float to activate backup plan if necessary.	Low technical risk, cost risk < $100K, moderate schedule risk, L2M delay < 3 months	25%	Low	0	40	100	
R-1.5-014	Mirror mounting design immaturity	IF it proves difficult to meet technical specs for mirror mounting … THEN the mirror mounting schedule and/or cost plans may be exceeded.	J. Arthur	9/12/2007	Moderate technical risk, cost risk < $100K, high schedule risk, L2M delay < 6 months	40%	Medium	$100	Mitigate	$20	1) Develop mirror mount specs early (SCR's Spring 2007). 2) Consider both procurement from outside vendors and internal fabrication. 3) Consider building small prototype to prove design. 4) Allow schedule for evaluation of prototype.	Low technical risk, cost risk < $50K, moderate schedule risk, L2M delay < 3 months	15%	Low	0	20	50	
R-1.5-015	Late changes due to evolving BCS requirements	If there are changes in the size and/or position and/or scope of the collimator system that are required by RP/RSC.	John Arthur	9/12/2007	Marginal technical risk, cost risk <$50K, moderate schedule risk, L2M delay < 1 month	75%	Low	$50	Accept	$0	Monitor evolution of RP/RSC requirements for approval of PPS/BCS design of main dump/safety dump systems.	Marginal technical risk, cost risk <$50K, moderate schedule risk, L2M delay < 1 month	75%	Low	0	25	50	
1.6	**X-Ray Endstations System**																	
R-1.6-008	Pricing fluctuations for procurement items	IF the prices for procurement items or the exchange rate for foreign procurements increases rapidly in the next years … THEN the actual cost for procurements will be higher than our current cost estimates	J. Arthur	9/12/2007	Low technical risk, cost risk < $100K, low schedule risk, L2M delay < 2 months	25%	Medium	$100	Accept	$0	Monitor prices of items that will be procured in the later years and especially from vendors that are the only suppliers of the items. Allow for sufficient contingency.	Low technical risk, cost risk < $100K, low schedule risk, L2M delay < 2 months	25%	Medium	0	40	100	
R-1.6-009	Scope uncertainties due to evolving requirements early in the design phase of the Atomic Physics Instrument	IF there are major scope changes for the atomic physics instrument … THEN the actual cost for this instrument may be higher than our current cost estimates, and the schedule may be delayed.	John Arthur	9/12/2007	Moderate technical risk, cost risk < $100K, moderate schedule risk, L2M delay < 3 months	25%	Medium	$100	Mitigate	$0	1. Adhere to the Requirements Documents (PRD, ESD, ICD, RDS). 2. Finalize scope at time of PDR (Fall 2007).	Low technical risk, cost risk < $25K, low schedule risk, L2M delay < 1 month	10%	Low	0	10	25	

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1.9	**Conventional Facilities**																	
R-1.9-028	In place Utility Protection	IF SLAC operational utilities are disrupted during construction … THEN, SLAC Operations will be impacted and construction schedule will be delayed for repairs and costs will increase	David Saenz	9/13/2007	Minimal technical risk >$100K but <$1M 2 weeks to repair	25%	Low	$100	Mitigate	$25	1 - Potholing 2 - Ground Penetrating radar 3 - Excavation permits 4 - Relocate utilities 5 - Put in place contingency plan.	Minimal technical risk >$100K but <$1M 2 weeks to repair	25%	Low	0	0	100	
R1-9-036	Turner Claim on Subcontract Value, bonds, insurance and profit	If TCCo prevails in arbitration/litigation then LCLS is subject to additional costs	David Saenz	9/13/2007	Minimal technical risk >$500K but <$5M No schedule impact	50%	High	$2,400	Mitigate	$650	Review claim - On going Validate through 9/08 Process any settlement 12/08	Minimal technical risk >$500K but <$5M No schedule impact	50%	High	(1,400)	0	2,400	
R1-9-037	InsituForm lets Affholder default on contract	If Affholder defaults then bonding company finishes contract with new contractor. Delays will be incurred until new contractor over comes learning curve and safety requirements.	David Saenz	9/4/2007	Minimal technical risk >$100K but <$1M L2M delay >3mo L1M delay <1mo	5%	Low	$250	Accept	$100	Work with bonding company to minimize impact.	Minimal technical risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo	5%	Low	0	0	250	
R1-9-042	FEH Hutches	If new hutch design more than budget or delayed	David Saenz	9/13/2007	Minimal technical risk >$1M but <$6M L2M > 2mo L3M > 3 mo	35%	Medium	$1,000	Mitigate	$0	• Scrub design • Begin design early • Alternate construction contracting (design/build)	Minimal technical risk >$1M but <$5M No schedule impact	25%	Medium	0	300	500	
R1.9-043	Construction Stand-Down	IF a safety incident occurs that requires any stand-down, THEN additional cost will be incurred	David Saenz	9/14/2007	Minimal Technical Risk Schudule impact: 1 month	5%	High	$2,750	Mitigate	$0	• Workers provide toolbox/tailgate meetings • Workers review JSA prior to engaging in activities • TCCo appoints safety coaches throughout the trades • TCCo Safety Manager routinely walks the site with trades • Review lessons learned	Minimal technical risk	2%	High	0	0	2,750	
								$47,900		**$1,095**					**(300)**	**5,060**	**27,625**	