LCLS Risk Registry
August 2008

Risk ID	Risk Title	If / Then	POC Owner	Date Last Revised	Risk Values Before Handling				Risk Control Actions			Risk Values After Handling						Risk Retired - Mark "X" for Yes and date
					Risk Consequence	Risk Probability	Risk Severity Level	Worst Case Cost Impact (AYK$)	Risk Handling Approach Avoid, Mitigation, Transfer, Accept	Estimated Cost to Implement Handling (AYK$)	Steps for Handling the Risk (Punch List)	Risk Consequence	Risk Probability	Risk Severity Level	Cost Impact (AYK$)			
															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	9/15/2008	Significant technical risk >$5M but <$10M L1M delay >3mo **Crisis Schedule Risk**	25%	High	$10,000	Mitigate	$80	• Perform a semi-annual bottoms-up estimate to complete risk-based contingency analysis on remaining work (F. Fernandez) • Perform a Monte-Carlo assessment annually to validate the bottoms-up contingency analysis (F. Fernandez) • Perform monthly assessment of Estimate at Complete (M. Reichanadter) • Perform monthly assessment of contingency on 'commitments to go' after reserving adequate contingency for scope under contract. • Month ending October - relook at costs in detail	Small technical risk >$100K but <$1M **Marginal Cost Risk** Negligible schedule risk	2%	Low	0	$250	$1,000	
R1.1-026	Installation Schedule	If LCLS installation activities are not well integrated throughout the project … then there is a risk of not meeting the start of commissioning milestones	R.M Boyce	9/15/2008	Significant schedule risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	40%	Medium	$1,000	Mitigate	$0	• Establish planning meetings to develop and integrate installation & checkout tasks at systems levels - 10/15/07(Done, weekly integration meetings held). • Hold twice monthly meetings between CF/TCCo/LCLS to clearly define EO parameters and dates (Done, started Dec 2007). • Define type of work to be allowed by LCLS during EO installations - start in September 2007 (Done) • Continue to monitor overall installation schedule taking into account delayed BO dates; late start EO areas were identified and installation proceeded accordingly - September 15, 2008. • Continue to review milestone float on a monthly basis to ensure schedule is maintained.	Significant schedule risk >$100K but <$1M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	10%	Medium	$100	$500	$1,000	
R1.1-027	Safety Incident or Accident	IF a safety incident or accident occurs on the SLAC site that requires a stand-down of work activities, THEN additional cost and possible schedule delays could occur.	Mark Reichanadter	9/15/2008	Significant schedule risk >$1M but <$4M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	5%	Low	$4,000	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 • Conduct regular safety audits (SPOs) • Utilize UTR and other SME from SLAC matrix organization as necessary • Review lessons learned at the completion of major activities • Added on-site medic	Significant schedule risk >$1M but <$4M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	<1%	Low	0	0	$4,000	
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.	R. M. Boyce	9/15/2008	Significant technical risk >$100K but <$5M L2M delay >3mo **Critical Schedule Risk**	15%	Medium	$4,000	Mitigate	$0	• Implement weekly walk-arounds by LCLS CF staff, LCLS System Managers, and LUSI Staff (done) • Include LCLS System Managers and LUSI Staff in the review and approval of trade contractor shop drawings (done) • Manage ODC through IMT, DCR and BCR processes - ongoing & being managed	Marginal schedule risk >$100K but <$1M **Marginal Cost Risk** L2M delay <1mo	10%	Low	0	$500	$1,000	
R1.1-029	Impact of FY2009 CR	IF there is an extended CR (assume 6 months) in FY2009, THEN work will need to be extended into FY2010	R.M Boyce	9/15/2008	Significant technical & schedule risk >$1M but <$5M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	50%	High	$5,000	Accept	$1,000	• Reprogram FY09 tasks to match BA profile (done) • Evaluate cost and contingency monthly	Significant schedule risk >$1M but <$5M L2M delay <6mo **Critical Schedule Risk**	10%	Medium	0	$200	$500	

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1.2	**Injector System**																	
1.3	**Linac System**																	
R-1.3-007	Emittance 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 can be successful.	Dave Schultz	9/15/2008	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Medium	$250	Accept	$0	• Perform emittance studies during the 2008 commissioning - done • Re-evaluate risk August, 2008 - done • Re-evaluate risk April 2009	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Medium	0	0	$250	
R-1.3-008	Linac Stripline BPM sensitivity	IF the old linac stripline BPM electronics performance is insufficient to support Undulator commissioning THEN they must be replaced by new-design electronics used in the injector and LTU	Dave Schultz	9/15/2008	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Medium	$500	Accept	$0	• Install coaxial signal cables for linac BPM electronics during 2007 shutdown (done) • Perform a trial of new BPM electronics to evaluate the level of improvement possible (done) • Re-evaluate risk August, 2008 (done) • Re-evaluate risk April, 2009	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Medium	0	0	$500	
1.4	**Undulator System**																	
R1.4-033	RF BPM breakage	If the windows in the rfbpms begin breaking… then the rfbpms will need replacment and this could delay commissioning of the undulator system and early science.	Dave Schultz	9/15/2008	Marginal technical risk >$100k but <$1M L3M delay >3mo **Significant Schedule Risk**	10%	Medium	$500	Mitigate	$100	• Begin design effort for BPM replacement 9/08 (done) • Develop work-around plans to mitigate delays 9/08 (done) • Re-evaluate risk April 2009	Marginal technical risk >$100k but <$1M L3M delay >3mo **Significant Schedule Risk**	10%	Medium	0	$200	$500	

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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	7/12/2008	Low technical risk Cost risk <$50K **Marginal Schedule Risk** L2M delay<1 month	10%	Low	$50	Mitigate	$0	• Adhere to BCR process. • Participate in Experimental Area design process • Formalize XTOD-LUSI interfaces with ICD • Utilize computer beam tools to allow accurate assessment of proposed changes.	Low technical risk Cost risk <$50K **Marginal Schedule Risk** L2M delay <1 month	2%	Low	0	0	$50	
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.	John Arthur	7/12/2008	Low technical risk Cost risk <$50K **Significant Schedule Risk** L2M delay < 3 months	10%	Medium	$50	Mitigation steps completed	$0	• Develop mirror specs, begin discussions with vendors early (done). • Evaluate specs at SCR's (done). • Procure mirrors with sufficient schedule float to activate backup plan if necessary (done).	Low technical risk Cost risk < $50K **Marginal Schedule Risk** L2M delay < 1 month	5%	Low	0	0	$50	
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.	John Arthur	7/12/2008	Low technical risk Cost risk < $50K **Significant Schedule Risk** L2M delay < 3 months	10%	Medium	$50	Mitigation steps completed	$10	• Develop mirror mount specs early (done). • Consider both procurement from outside vendors and internal fabrication (done). • Consider building small prototype to prove design (done). • Allow schedule for evaluation of prototype (done).	Low technical risk Cost risk < $50K **Marginal Schedule Risk** L2M delay < 1 months	2%	Low	0	0	$50	
R-1.5-015	Late changes due to evolving shielding requirements	IF there are changes in the size and/or position of the collimators and shielding elements that are required by RP/RSC… THEN the schedule and/or cost plans for these shielding components may be exceeded.	John Arthur	7/12/2008	Low technical risk Cost risk <$50K **Marginal Schedule Risk** L2M delay < 1 month	20%	Low	$50	Mitigate	$0	• Monitor evolution of RP/RSC requirements for approval of shielding design for X-ray areas. • Respond promptly to RP reqests for shielding design concepts, ray traces, etc.	Low technical risk Cost risk <$50K **Marginal Schedule Risk** L2M delay < 1 month	10%	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	John Arthur	7/12/2008	Low technical risk Cost risk < $100K **Significant 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.	Low technical risk Cost risk < $100K **Significant 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	7/12/2008	Low technical risk Cost risk < $25K **Marginal Schedule Risk** L2M delay < 1 months	10%	Low	$25	Mitigation steps completed	$0	• Adhere to the Requirements Documents (PRD, ESD, ICD, RDS). • Finalize scope at time of PDR (done).	Low technical risk Cost risk < $25K **Marginal Schedule Risk** L2M delay < 1 month	10%	Low	0	$10	$25	

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1.9	**Conventional Facilities**																	
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 above budget amount	David Saenz	9/15/2008	Minimal technical risk >$500K but <$5M **Significant Cost Risk** No schedule impact	30%	High	$300	Mitigate	$650	• Claim referred to arbitration (done) • Attorneys "negotiated" and returned for settlement (done) • Negotiate terms with Turner (partial) • Issue contract modification • $2.2M budgeted for claim settlement - total claim $4.6M	Minimal technical risk >$500K but <$5M **Significant Cost Risk** No schedule impact	30%	High	0	$300	$500	
R1-9-042	FEH Hutches	If new hutch design more than budget or delayed, THEN additional cost will be incurred	David Saenz	9/15/2008	Minimal technical risk >$1M but <$5M **Significant Cost Risk** L2M > 2mo L3M > 3 mo	35%	Medium	$1,000	Mitigate	$0	• Begin design early 8/08 • Scrub design 10/08 • Alternate construction contracting (design/build) 10/08 • Obtain estimates in advance to final design 7/08 (done)	Minimal technical risk >$100K but <$1M **Marginal Cost Risk** No schedule impact	50%	Medium	0	$500	$1,000	
R1.9-043	Construction Stand-Down	IF a safety incident occurs that requires any stand-down, THEN additional cost will be incurred	David Saenz	9/15/2008	Minimal Technical Risk Schedule impact: 1 month L2M > 3mo **Critical Schedule Risk**	20%	Medium	$1,000	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 • LCLS staff routinely walks site • Semi-monthly evaluation of trade performance	Minimal technical risk **Critical Schedule Risk** L2M > 1 mo	10%	Medium	0	$200	$1,000	
R1.9-044	Major Equipment Failure	If a major piece of new equipment fails (to include boiler, transformer, compressor, air handlers, elevator) then commissioning and final completion will be delayed	David Saenz	9/15/2008	Schedule impact: <3 months **Marginal Cost Risk** >$100K but <$1M L3M < 3mo	20%	Low	$250	Mitigate	$0	• Field testing/pre-functional testing • Follow proper start up and operations sequence • Safety verifications in place prior to operations	Minimal technical risk >$100K but <$1M **Marginal Cost Risk**	10%	Low	0	$100	$250	
R1.9-045	Turner extends beyond Nov. 2008 (delays)	If Turner extends beyond Nov. 2008 then there will be delays to the schedule	David Saenz	9/15/2008	Minimal Technical Risk Schedule impact: 1 month L2M < 3mo **Critical Schedule Risk** **>$1M but <$5M**	20%	Medium	$2,000	Mitigate	$300	• Prepare finish schedule • Re-sequence activities • Accelerate construction (10 hr days; 6 day wk) • Delete change order scope • Weekly update of schedule - critical issues	Minimal Technical Risk >$0 but <$1M **Marginal Cost Risk**	10%	Medium	0	$0	$2,000	
								$30,125		**$2,140**					**$100**	**$2,825**	**$13,825**	