LCLS Risk Registry
February 2009

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	3/4/2009	Significant technical risk >$2M but <$4M L1M delay >3mo **Crisis Schedule Risk**	25%	High	$4,000	Mitigate	$0	• Perform a semi-annual bottoms-up estimate to complete risk-based contingency analysis on remaining work (F. Fernandez) • Perform monthly assessment of Estimate at Complete (M. Reichanadter)	Small technical risk >$100K but <$1M **Marginal Cost Risk** Negligible schedule risk	2%	Low	0	$250	$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	12/9/2008	Significant schedule risk >$1M but <$2M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	5%	Low	$2,000	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) • Ultilze UTR and other SME from SLAC matrix organization as necessary • Review lessons learned at the completion of major activities	Significant schedule risk >$300K but <$1M L2M delay >3mo, L1M delay <1mo **Critical Schedule Risk**	<1%	Low	0	0	$1,000	
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	3/4/2009	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: On-going. • Develop and manage a priority list of ODC and review with project management. • Manage ODC through IMT, DCR and BCR processes. IMT is actively working with managers on a weekly basis to review proposed changes: no major changes requested as of 3/4/09.	Marginal schedule risk >$100K but <$1M **Marginal Cost Risk** L2M delay <1mo	10%	Low	0	$500	$1,000	
R1.1-030	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	3/4/2009	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 - 1/5/09 *Done - weekly installation meetings held. • Develop clear goals for photon delivery into the FEE and NEH 1/5/09: 3/4/09 phase 1 & 2 plans developed to deliver beam into FEE and approved by management and safety officers. • Continue to review installation float on a monthly basis to ensure schedule is maintained.	Marginal schedule risk >$100K but <$1M **Marginal Cost Risk** L2M delay <1mo	10%	Low	$100	$500	$1,000	
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	3/3/2009	**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 - done • Re-evaluate risk August 2009 - retire if not realized	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~10%	Low	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	3/3/2009	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Medium	$200	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, (done) • BPM electronics need to be replaced for Operations and Control Systems reasons not associated with this stated risk. • Find most cost effective way to implement this change and retire this risk - August	**Significant Schedule Risk** >$100K but <$1M L3M delay >3mo, L2M delay <3mo	Unlikely - ~20%	Low	$200	$200	$200	
1.4	**Undulator System**																	
R1.4-033	Undulator System Mechanical failure	If the the Undulator system experiences mechanical failure (eg. windows in the rfbpms begin breaking)… then the system will need repair and this could delay commissioning of the undulator system and early science.	Dave Schultz	3/3/2009	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) • Exercise all systems and assess reliability 11-12/08 (done) • Re-evaluate risk April 2009 (done) • Continue with BPM repair R&D • Continue with motor repair design	Marginal technical risk >$100k but <$1M L3M delay >3mo **Significant Schedule Risk**	10%	Low	0	$0	$500	

LCLS Risk Registry
February 2009

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	
1.5	**X-Ray, Transport, Optics & Diagnostics System**																	
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	11/24/2008	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 (Hal Tompkins, Peter Stefan). • 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	5%	Low	0	$25	$50	
1.6	**X-Ray Endstations System**																	
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	11/24/2008	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	
R-1.6-010	Risk of FEL damage to B4C absorbers	IF there is a perceived risk that the FEL beam can cause damage to the B4C photon absorbers in the LCLS dump area, THEN normal FEL operation will not be permitted	John Arthur	11/24/2008	**Significant Schedule Risk** L2M delay <3 months	50%	High	$1,000	Mitigate	$100	• Prepare B4C test facility in Beam Dump area, install test facility in March 2009, monitor integrity of B4C test piece during early FEL operation, follow B4C test plan as FEL intensity/repetition rate increases.	**Low schedule risk** L2M delay <1 month	10%	Low	0	$0	$100	
R-1.6-011	Schedule risks to early science milestone	IF there are delays in AMO procurement and/or installation, THEN the early science milestone could be missed	John Arthur	11/24/2008	**Significant Schedule Risk** L2M delay < 2 months	50%	High	$1,000	Mitigate	$500	• Add additional manpower to AMO team, utilize SLAC MFD manpower to speed assembly/checkout of AMO vacuum system	**Low schedule risk** L2M delay <1 month	10%	Low	0	$100	$500	
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	11/24/2008	Minimal technical risk >$500K but <$5M **Significant Cost Risk** No schedule impact	30%	High	$3,000	Mitigate	$300	• Claim referred to arbitration (done) • Attorneys "negotiated" and returned for settlement (done) • Negotiate terms with Turner (on going) • 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	$1,000	$3,000	
R1.9-046	FEH Hutches - Construction	If hutch construction is delayed then installation of the technical equipment will also be delayed.	David Saenz	**3/5/2009**	Schedule impact: <3 months Marginal Cost Risk >$100K but <$1M L3M < 3mo	20%	Medium	$200	Mitigate	$0	• Early procurement of structural steel • Timely completion of hutch design - March 2009 • Timely procurement of Constrcution Contract - April 2009 • Construction Management using BMP	Minimal technical risk >$100K but <$1M **Marginal Cost Risk**	10%	Low	0	$25	$200	
R1.9-047	LCLS Office Space	If office space project is not completed as scheduled, the Critical Path (based on Project float) to CD-4 will be driven by office space availability.	Jess Albino	**5/7/2009**	Schedule impact: <3 months Marginal Cost Risk >$100K but <$1M L3M < 2mo L2M <1mo	30%	Medium	$600	Mitigate	$100	• Strict Enforcement of Contract Schedule • Schedule Incentives (and Liquidated Damages) in Construction Contract • Extended work hours (10 hr shifts) • Schedule Resequence (Concurrent activities) • Acceleration (increased workforce, 6-day weeks, multiple shifts) • Design to support Phased-development • Advance Work Planning and Control (review and approve)	Minimal technical risk >$50K but <$100 **Marginal Cost Risk** No schedule impact	10%	Low	0	$50	$100	
								$17,825		**$1,100**					**$300**	**$2,660**	**$8,925**	