LCLS Risk Registry
April 2006

No.	Risk Title	Date Submitted	Submitted By	Date Last Revised	Owner	If	Then	Risk Timeframe Which phase could this event occur? Design, Construction, and/or Commissioning	Probability of Event (percentage)	Current Cost Impact Estimates (use $k) O: Optimistic, ML: most likely, P: pessimistic			Risk Contingency	Schedule Impact (use time in months) O: Optimistic, ML: most likely, P: pessimistic			Overview of Risk Handling Plan	Risk Handling Approach Avoid, Mitigation, Transfer, Accept	Steps for Handling the Plan	Risk Retired - Mark "X" for Yes and date
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1.1	**Management**																			
R1.1-001	Change Control	5/52004	Mark Reichanadter	2/21/2006	Mark Reichanadter	If a baseline change control process is not effective,	Then change could get implemented without proper review and approval.	Design, Construction	**2%**	**1000**	**5000**	**10000**	**100**	**0**	**1**	**2**	Implement change control system and review cost, schedule and scope against baseline on a monthly basis.	Mitigate	7/04 - Set baseline process. 8/04 thru CD-4 - Review cost, schedule and contingency status monthly. (Schedule for Steps: Ongoing through the life of the project.)	
R1.1-002	Basis of Cost Estimate is not documented	5/52004	Mark Reichanadter	2/21/2006	Mark Reichanadter	IF the design costs are not properly documented, and supported with accurate backup information	THEN the real costs of the scope of work is unknown, and the project may carry cost risks that cannot be covered by the estimated cost contingency.	Design, Construction	**2%**	**1000**	**5,000**	**10000**	**100**	**0**	**6**	**12**	Ensure that the Basis of Estimate documentation is provided for all design decisions, procurements and subcontracts to support the baseline cost of the LCLS. Ensure also that estimators are experienced in cost estimating and that they understand the full scope of work.	Mitigate	Establish a Basis of Estimate at the CD-2 timeframe. Continue to update the WBS Dictionary through the BCR process. Use experienced estimators and/or vendors to provide estimates. Plan an updated cost to complete at the 20-25% completion point. (Schedule for the Steps: ongoing through the life of the project.)	
R-1.1-003	Project Schedule Validity	5/52004	Mark Reichanadter	2/21/2006	Mark Reichanadter	If the project schedule is inaccurate due to incomplete planning or logic errors/omissions,	Then the integrated project schedule may be inaccurate.	Design, Construction, Commissioning	**5%**	**0**	**1000**	**2000**	**50**	**0**	**3**	**6**	Include schedule contingency and evaluate schedule.	Accept, Mitigate	Understand the critical path, optimize areas of float, look for opportunities to continuously improve the overall schedule. Monitor float with respect to L2 and L3 milestones and CD-4.	
R1.1-006	Project Personnel	5/52004	Mark Reichanadter	2/21/2006	Mark Reichanadter	If the project cannot recruit high-quality personnel to key positions,	Then overall project expertise and capabilities may not meet the project's requirements, and/or the ability for the project team to respond to problems may be reduced.	Design, Construction, Commissioning	**2%**	**0**	**1000**	**5000**	**20**	**0**	**6**	**12**	Communicate regularly with Lab management on the resource needs of the project, proactively recruit key personnel for upper management and engineering positions on the project.	Mitigate	With the re-organization of SLAC's upper management, the LCLS Project Director has an office in the SLAC directorate to ensure the personnel needs of the LCLS project are accurately known and communicated to the SLAC Director, and Deputy Directors.	
R1.1-008	LCLS Timing System	5/9/2004	Hamid Shoaee	3/16/2006	Hamid Shoaee	If there is a delay in implementation or technical deficiency in the following: • PNET receiver for EPICS • Master Pattern Generator for EPICS • Event Receiver for EPICS • Timing Distribution network	THEN, the existing SLC control system and the new LCLS controls will not be integrated, preventing operation of the LCLS from the MCC and rendering useless many essential SLC controls and many new LCLS devices such as the BPMs.	Construction, Commissioning	**30%**	**400**	**1000**	**2000**	**300**	**3**	**4**	**6**	Adapt the timing pulse generator design from the Swiss Light Source for use at LCLS. The module has 20 ns resolution but it is not yet clear that the SLS design meets all of the LCLS requirements.	Accept	1. Develop and test 3 LCLS timing modules (Schedule for the Steps: 2005-2006) 2. Perform system integration tests on a controls test stand in B406 adjacent to FFTB where FIDO is available. (Schedule for the Steps: 10-2005 thru 4-2006) 3. Investigate alternative solutions. (Schedule for the Steps: 2007) 4. Implement alternative solution and continue work on preferred solution. (Schedule for the Steps: 2008)	
R-1.1-009	Serious Accident on the SLAC Site	1/3/2005	Mark Reichanadter	3/17/2006	Mark Reichanadter	IF there is a serious accident on the SLAC site by SLAC employee, contractor or visitor	Then a work stoppage of all LCLS activities regardless of the accident cause or effect could occur. This is a low probability, high consequence risk.	Design, construction, commissioning, pre-operations	**2%**	**1000**	**10000**	**20,000**	**200**	**3**	**4**	**6**	Implement an Integrated Safety Management System (ISMS) for the LCLS Division and Project. Ensure that LCLS upper-level management supports the ISMS and that ES&H issues are given the highest priority. Ensure that adequate ES&H resources (both technical and construction) are devoted to maintaining a safe working environment for LCLS staff.	Mitigate	Constant communication and regular training for LCLS staff that ES&H and ISMS is the highest priority for the LCLS. Provided additional construction ES&H expertise on the project. Initiate weekly ISMS job-site walks on LCLS construction sites	

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R-1.1-010	Co-Location of Core LCLS Staff	1/3/2005	Mark Reichanadter	3/17/2006	Mark Reichanadter	If the core team of managers, scientists, engineers, and designers cannot be co-located at its three partner labs	Then, a loss of coordination and communication will be realized within the LCLS project	Design, construction, commissioning, pre-operations	**30%**	**50**	**200**	**400**	**60**	**1**	**2**	**3**	Discuss regularly with Lab management the need for co-located space for the LCLS teams. Effectively utilize LCLS's existing space in B280.	Avoid, mitigate	In general, LCLS will communicate regularly with Lab management at SLAC to facilitate the co-location of the central design group in B280. As of Sep05, LCLS occupies Module A and Module B of B280 (13,000 sq ft. ~84 offices). There are still LCLS people not co-located, particularly in engineering and design. With the start of construciton scheduled for March 2006, the CF will relocate near construction in B211, opening up additional offices for co-locating the engineering and design team. LCLS will continue to communicate its space needs to SLAC management. For ANL and LLNL have similar plans in place to co-locate their staff.	
R-1.1-011	Equipment Storage and Staging Area	1/3/2005	Mark Reichanadter	3/17/2006	Richard M. Boyce	IF the LCLS cannot obtain secure storage space for equipment and deliverables prior to installation	THEN there is the potential for loss or damage to the LCLS deliverables	Construction, commissioning, pre-operations	**10%**	**400**	**1000**	**2000**	**100**	**3**	**4**	**6**	Develop staging plan with estimates on space needs and timing. Describe security and access requirements and any special equipment requirements and work with SLAC to ensure adequate space is available when needed	Avoid, mitigate	The LCLS Installation Manager will prepare a detailed space planning memo that will allocate the necessary space for equipment staging by February 2006. Areas identified for LCLS to date are: B026 for magnets and equipment; B750 (104) for Undulator assy & storage by Dec '06; B750 (106) for X-ray/Far Hall hardware staging by Jan '07; storage trailers identified at MFD hub for LCLS fabricated parts. Asst. Manager for Undulator has been hired at SLAC and will coordinate the flow of materials for undulator installation.	
R-1.1-013	Lack of formally approved specifications (PRD's, ESD's, ICD's)	4/18/2005	Mark Reichanadter	4/13/2006	Mark Reichanadter	IF the LCLS specifications are not well-defined and documented in a formal manner	THEN there is a potential for loss of project coordination/communication and a risk to the schedule and technical quality of the LCLS project.	PED, LLP, Construction	**10%**	**200**	**1000**	**2000**	**100**	**1**	**3**	**6**	The LCLS Quality Assurance Manager tracks and reports the approval of LCLS technical specifications to the CCB.	Avoid, mitigate	Put together metrics for distribution in the weekly LCLS Physics meetings. # of PRD's/ESD's/ICD's/system. How many approved/week/month? Plot trends.	
R-1.1-014	PLC PPS Design Evaluation	3/31/2005	P. Krejcik	3/16/2006	Hamid Shoaee	If the SLAC Citizen Review Committee does not accept the use of Programmable Logic Controllers in the Personnel Protection System and condones only old electromechanical logic systems	Then it will be difficult to implement a sophisticated safety interlock system that can be commissioned and verified within the scheduled time and maintained in the future.	Design, Construction	**50%**	**200**	**500**	**1000**	**250**	**3**	**6**	**12**	Get the SLAC Citizen Review Committee to review the use of the PLC will be reviewed in the second quarter of FY 06.	Mitigate, Accept	1) Michael Saleski(LCLS) and John Forestal (APS) added 01/06. 2) Complete the design review(s) in March 2006 3) Complete the citizen review for PLC use in second quarter of FY06 COMMENTS: Many other laboratories have used PLCs for PPS, but is has never been used at SLAC. One previous attempt to use PLCs at SLAC did not pass the Citizen review.	
R-1.1-015	Linac Reliability	6/3/2005	Dave Schultz	3/2/2006	Dave Schultz	If the reliability of the Linear accelerator is not high	Then the experimental beam time will be impacted.	Operations	**30%**	**200**	**500**	**1000**	**150**	**1**	**3**	**6**	A reliability budget will be developed to identify which systems are the most critical from the standpoint of reliability. This budget will be maintained over time. Systems which are critical will be analyzed for improved reliability.	Mitigate	Steps for Handling: 1) Estimate availability of existing SLAC magnet power supply systems. (July 2005) 2) Investigate availability options for magnet power supply systems. (Dec 2005) 3) Develop a availability budget for all Linac systems to identify and understand problem areas. (Mar 2006) 4) Develop plans to improve availability of identified critical areas. (May 2006)	

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R-1.1-016	LCLS MPS System	6/6/2005	Patrick Krejcik	3/16/2006	Hamid Shoaee	If the Machine Protection System fails to respond and shut of the beam within one machine pulse of detecting a critical component failure or a beam loss	Then the sensitive components of the machine, in particular the undulator, will be put at considerable risk of being permanently damaged and will require replacement.	Design, Construction, Commissioning, Pre-Operations	**10%**	**500**	**1000**	**30000**	**100**	**3**	**6**	**12**	Evaluate the requirements, review existing solutions, hire an EE, design, develop a verification plan	Mitigate, Accept	1. Specify the requirements for the MPS (Schedule for the Steps: 2004) - DONE 2. Evaluate MPS implementations at other laboratories (Schedule for the Steps: 2005) - DONE 3. Hire an EE into the LCLS organization (Schedule for the Steps: 9-2005) - DONE 4. Develop an ESD (Schedule for the Steps: 2006) - DONE 5. Provide a PLC based MPS for the FY 07 operation where there is only 1 mitigation device. 6. Develop a testing plan to verify correct operation (Schedule for the Steps: 2007)	
R-1.1-017	Beam Diagnostic Control Systems	6/6/2005	Patrick Krejcik	3/16/2006	Hamid Shoaee	If the beam parameters cannot be measured with sufficient precision on a shot by shot basis	Then the beam cannot be reproducibly tuned to the desired values for FEL operation	Design, Construction, Commissioning, Pre-Operations	**25%**	**500**	**1000**	**2000**	**250**	**3**	**6**	**12**	Evaluate the requirements, review existing solutions, test prototype devices on a beamline with short bunches and integrated controls	Mitigate	1. Specify the requirements for diagnostic devices (Schedule for the Steps: 2004-2005) 2. Evaluate diagnostics at other laboratories (Schedule for the Steps: 2004-2005) 3. Build prototype BPM stripline receiver (Schedule for the Steps: 3-2006) 4. test prototype stripline receiver in SLAC linac (Schedule for the Steps: 6-2006) 5. Build and test cavity BPM and electronics at APS, subject to APS schedule 6. Test and integrate devices with controls (Schedule for the Steps: 3-2005 thru 10-2006) 7. Build and install bunch length monitor on the BC1 vacuum chamber and test during LCLS commissioning (Schedule for the Steps: 6-2006 thru 12-2006) Comments: The first priority diagnostics are cavity BPMs and bunch length monitors. Second priority are wire scanners with beam loss monitors and Profile Monitors	
1.2	**Injector System**																			
R-1.2-001	Laser Beam Temporal Shaping	5/4/2004	S. Gilevich	4/12/2006	Sasha Gilevich	If we are unable to procure or preserve the laser pulse flattop temporal shape (set by the pulse shaper) during amplification and UV conversion	Then the laser pulse on the cathode will not meet the temporal profile requirements and the emittance of the electron beam leaving the gun will be too large. And the optical components down the line could be damaged by the spikes in the amplified pulse shape	commissioning	**75%**	**400**	**400**	**>1000**	**300**	**0**	**0**	**6**	Conduct R&D in collaboration with LLNL. The work will be performed mainly at LLNL with SLAC participation. The work will be coordinated by SLAC.	Mitigate	• Development of the temporal pulse shape diagnostics. (Schedule for steps: June 2006) • Testing and optimizing of the pulse shaping technique. (Schedule for steps: June 2006) NOTE: Parts ordered for diagnostic. Modeling done on shaping	
R-1.2-005	'06 Linac Downtime Work	5/7/2004	Richard F. Boyce	4/12/2006	Eric Bong	If the DL and SAB beamlines are not installed before the Linac downtime is over	Then the injector cannot inject the beam into the linac or complete commissioning to the SAB dump	Construction	**30%**	**0**	**0**	**200**	**0**	**0**	**0**	**12**	Prepare the work in detail in advance. Work two shifts during the '06 downtime, (if required) Complete the work during the '06 winter 2 week break. Complete the work during the '07 linac downtime.	Mitigate	Plan work in advance; Refine P3 schedule Work two shifts during '06 down Work during '06 winter break Work during '07 linac downtime	
R-1.2-006	RF Gun at 120 hertz	5/7/2004	Richard F. Boyce	4/12/2006	Eric Bong	IF the RF gun changes shape due the increased heat load of 120 hertz operations	THEN the RF gun will not resonant with the klystron and will not accelerate the electron beam properly	Commissioning	**5%**	**0**	**0**	**250**	**0**	**0**	**0**	**12**	Design the gun in-house to coordinate the RF and mechanical analysis and incorporate into the mechanical design. Fabricate gun in-house with in-process testing. Fabricate two sets of parts. Test first assembly of parts at 120 Hz as early as possible. Use test data to modify second set of parts to correct any design defect. Incorporate push-pull tuning cells into the RF gun design.	Mitigate	• Design gun. (Schedule for steps: June thru December 2006) • Fabricate gun. (January thru June 2006) • Test gun (August 2006) NOTE: PDR complete; FDR complete; design complete and fabrication in progress	

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R-1.2-008	Insufficient Charge	1/5/2005	Eric Bong/Dave Dowell	4/12/2006	Cecile Limborg	IF the gun does not produce the specified charge	THEN the FEL will not produce the required 10^12 photons per pulse	operations	**50%**	**< 100**	**1000**	**> 5000**	**500**	**0**	**3**	**12**	The beam charge is determined by the drive laser energy and the cathode quantum efficiency. The approach should be to first determine which of these subsystems is not meeting its specification, then correct that one. Mitigate using R&D on non linear conversion. In parallel, investigate possibility of lower charge operation that will satisfy LCLS program goals.Develop gun load lock as upgrade.	Mitigate	• Run low charge, 0.2nC, that meets LCLS program goals. Low charge solution also mitigates AC conductivity risk. (Schedule for steps: Perform low charge operating point start-to-end simulations in FY05-FY06.) • Drive laser UV energy is low: Put more resources into the non-linear conversion system via the LLNL SOW plan. (June 2006.) • Cathode QE is low: Use plasma discharge cleaning to improve QE. (Schedule for steps: Test plasma discharge cleaning - October 2006)	
R-1.2-009	Emittance Specification	1/5/2005	Eric Bong/Dave Dowell	4/12/2006	Cecile Limborg	IF emittance from injector does not meet specification	THEN the FEL will not perform to its specifications	operations	**25%**	**100**	**500**	**1000**	**125**	**0**	**3**	**>3**	The injector emittance is determined by drive laser shaping and the cathode quality. The best approach to improving the emittance is to put more effort into the drive laser system.	Mitigate	1. Improve the drive laser by proceeding with the R&D at LLNL.	
R-1.2-011	Reliability of the Injector Drive Laser System	6/4/2004	Sasha Gilevich	3/17/2006	Sasha Gilevich	IF any of the drive laser system components fails (for example, due to optics damage or due to diode laser failure)	THEN the whole LCLS will be shut down for a certain period of time required to find and fix the problem and realign and check the laser system. This downtime period can be significant due to the complexity of the system and to the fact that the main components will be built by the outside vendor and could be fixed only by its manufacturer.	Pre-operations	**30%**	**350**	**500**	**1000**	**150**	**0**	**1**	**6**	Plan the laser bay to have the space and utilities to accommodate the second laser system. Request the Project Office to allocate FY07 funds towards procurement of the second laser system.	Accept	Re-evaluate the risk based on the performance of the first laser system (Schedule for steps: 10/2006)	

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R-1.2-012	Laser Beam Spatial Shaping	3/8/2005	Sasha Gilevich	4/12/2006	Sasha Gilevich	IF we are unable to produce and preserve the UV laser pulse round flattop spatial shape (set by the reshape) during the transport of the beam to the cathode	THEN only small transverse fraction of the beam will have small enough emission to lase. And the tuning for emittance preservation will be very difficult.	Design, Construction	**10%**	**50**	**60**	**100**	**6**	**0**	**0**	**6**	Conduct R&D in collaboration with ANL. The work will be performed mainly at ANL with SLAC participation. The work will be coordinated by SLAC.	Mitigate	• Testing of the UV conversion process of the spatially shaped pulses (Schedule for steps: DONE) • Imaging of the spatially shaped UV pulses and optimization of the optical system (Schedule for steps: 90% complete as of 4-12-06)	
R-1.2-013	Sector 20 Beneficial Occupancy	1/4/2005	Eric Bong	4/12/2006	Eric Bong	If the beneficial occupancy of Linac Sector 20 is delayed	THEN the components scheduled for installation in the laser alcove and the injector vault will be delayed	Construction	**10%**	**0**	**0**	**< 1000**	**0**	**0**	**0**	**6**	Accept risk of delay to install beamline components due to Li20 Beneficial Occupancy delay and minimize impact by regular inquiry into LI20 construction progress and revising installation schedule to accommodate	Accept	1. Regularly review Li20 conventional construction progress. 2. Re-schedule installation work. 3. Establish co-occupation to install beamline components during alcove construction.	**X 4-12-06**
1.3	**Linac System**																			
R-1.3-001	Linac RF Stability	5/6/2004	Eric Bong	4/12/2006	Eric Bong	If the RF stability physics requirements are not met,	Then the electron bunch length will vary with phase instability and the electron energy will vary with the amplitude instability. This will cause fluctuations in the SASE FEL pulse length and peak brightness.	Commissioning, Pre-Operations	**50%**	**500**	**1000**	**2000**	**500**	**0**	**6**	**24**	Mitigate risk of failure to achieve RF stability requirements by instituting R&D efforts to develop an appropriate signal to use as feedback to establish RF stability. Model feedback effectiveness. Test feedback on Linac klystron using EPICS control mockup in Linac Sector 21.	Mitigate	1. Model feedback - Done 2. Develop Bunch Length Monitor inhouse (Jan 2006 - October 2006) 3. Design pick-off downstream of BC1 and design BLM integration (March 2006-July 2006) 4. Fabricate BC1 pickoff & BLM integration (April 2006 - July 2006) 5. Install LLRF incorporate BLM feedback (December 2006 - July 2007)	

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R-1.3-006	FFTB Decommission	1/11/2006	Eric Bong	4/12/2006	Eric Bong	If removal of FFTB components following FFTB decommission is delayed or takes longer than scheduled-	Then start of BTH construction may be delayed which could result in a delay in assembling and commissioning the LTU.	Construction	**20%**	**0**	**100**	**1000**	**0**	**0**	**3**	**6**	Schedule equipment removal and update LCLS project plan to reflect component removal schedule.	Mitigate	• Establish component removal schedule with other SLAC groups. • Report schedule to LCLS project office to allow updates to affected construction schedules. • Assign removal responsibilities. • Perform removal and track progress. Schedule for the Steps: Plan removal activities January 2006 Assign Responsibilities January 2006 Report schedule to PO February 2006 Remove components March 2006 Complete removal - TBD	**x retire and move to CF**
1.4	**Undulator System**																			
R-1.4-003	Fixed Support Design Specification	5/9/2004	Steve Milton	10/11/2005	Steve Milton	If the fixed supports are not stable over time	Then beam-based alignment need to be performed too often to achieve availability and stability functional goals	Design	**15%**	**50**	**100**	**100**	**15**	**3**	**5**	**6**	Get more design and engineering support on this.	Avoid	Cost of an additional engineer and designer for 3 months. Added mechanical engineer to this system. Refined the Specifications. Planned for a test of the complete support system.	
R.1-4-004	Chamber Roughness Specification	5/9/2004	Dean Walters	1/11/2006	Steve Milton	If the surface roughness of the chambers is too high	Then it is very likely that there will be significant reduction in total power delivered or no lasing at all.	Design	**25%**	**50**	**100**	**120**	**25**	**3**	**5**	**6**	Prototyping of various chamber configurations will be performed and the results of the prototype chambers measured roughness will be given to a theorist to determine if it meets the performance specifications. Methods of reducing the surface roughness of the chambers will also be tested.	Mitigate	• Prototyping of various chambers will be performed (Mar. 06) • Prototype chamber roughness wil be measured (Apr. 06) • Measured roughness will be given to HD Nohn and G. Stupakov for accessment (May 06) • Methods of reducing the surface roughness further if needed will be developed.	

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R-1.4-007	Magnet Block Radiation Damage	5/9/2004	Marion White	3/16/2006	Stephen V. Milton	If the high-energy electron beam strikes any of the undulator magnet blocks,	Then it is very likely that some amount of radiation damage will occur, resulting in partial demagnetization of individual magnets within the undulator.	Commissioning, Pre-Operations	25%	50	100	200		<1	2	4	There is risk that one or more undulators will be damaged in part or in total by radiation as a result of commissioning or operational beam strikes.	Mitigate, Accept	The risk handling plan is: 1) Collimators are installed to protect the undulators 2) Equipment protection devices, including radiation sensors will not allow beam operation under conditions known to be dangerous to the undulators. 3) Seven (7) spare undulators are being purchased. 4) All undulator magnets are made of a new higher coercivity material which is less sensitive to radiation damage. 5)Undulators can be rolled out of the beam to do beam tune-up studies. 6) Commissioning procedures developed with undulator protection as one of the prime goals.	
R-1.4-012	Undulator Component Motion	12/1/2004	Josh Stein	3/16/2006	Stephen V. Milton	IF radiation strikes the motors used to move devices within the undulator hall.	THEN the motors may become damaged to the point where they cease to function, or function in an inappropriate manner.	Design	50%	50	50	100	25	2	3	4	Determine radiation susceptibility of pertinent motors. Develop alternative motor choices and anticipate backup installation.	Mitigate	• Test motors for damage in SRing environment (Mar. 06) • Characterize the threshold for motor resistance (Apr. 06) • Plan on installation of "worst case" motor choice to minimize impact on replacing existing motors as necessary.	
R-1.4-019	Undulator Tunnel Temperature	4/20/2005	Geoff Pile	3/16/2006	S. Milton	IF the allowed tunnel temperature variation of +/- 0.5 C occurs too rapidly,	THEN, due to thermal expansion effects, the quadrupoles and beam position monitor positions might move outside of their allowed ranges.	Design	20%	50	100	200	20	<1	2	3	There is a concern that the sizing and capability of the air handling/HVAC system in the tunnel may not hold the temperature tolerances uniformly down its length. There will be concentrated heat loading in the sections between the undulator strongbacks and the design must account for this.	Mitigate	• Make a detailed list of all power loads within the tunnel (Schedule: To be completed by Oct. 31, 06) - DONE • Independently review tunnel HVAC design with expert engineers. - DONE • Present thermal analysis and design mitigation in HVAC design review – 2006 • Test and validate on SUT (April 2006)	
R-1.4-021	Earth's Field	4/20/2005	Geoff Pile	3/16/2006	Steve Milton	If the earth's magnetic field in the tunnel is significantly different than that formed in the MMF	Then BBA will not converge to the level required for lasing to work.	Design	50%	100	200	300	100	3	6	12	MMF will set up undulator alignment and allow for earths estimated field to be taken in consideration. The field can be considerably different in many locations. It is possible it may not be what we predict it is in the tunnel once it's built. Install a mu-metal shield over the undulators to buck the Earth's field.	Mitigate	• Do more in depth study of earth field in our environment. (DONE) • Study the use of magnetic shields around the undulator. (DONE) • Install mu-metal shields on 1st article and test (April 2006)	
R-1.4-023	Optical Transition Radiation Imaging Assembly	8/9/2005	Geoff Pile	3/16/2006	S. Milton	If the Optical Transition Radiation instruments are removed from the Long Breaks in the Undulator Beam Line	The elimination of e-beam profiling and complementary beam position monitoring (to a few microns, relative) capability from the LCLS undulator system will increase the risk of attaining commissioning goals and final SASE performance in an over 100-m long undulator system with state-of –the-art specifications on beam alignment and beam overlap.	Commissioning	33%	600	1000	2000	330	1	3	6	The work (item) has been removed to improve the cost risk to the project.	Accept	The work (item) has been removed to improve the cost risk to the project.	

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R-1.4-024	Scanning Wire Assembly	8/9/2005	Geoff Pile	3/16/2006	S. Milton	If the Wire Scanner instruments are removed from the Long Breaks in the Undulator Beam Line	The inability to measure the electron beam profile and match will greatly increase the risk of attaining FEL saturation goals during LCLS commissioning. This will translate into increased commissioning time/cost and will result in the delay for users operation.	Commissioning	**33%**	**600**	**1000**	**2000**	**330**	**1**	**3**	**6**	The work (item) has been removed to improve the cost risk to the project.	Accept	The work (item) has been removed to improve the cost risk to the project.	
R1.4-025	Vacuum Chamber Development Schedule	3/8/2006	S. Milton	3/8/2006	S. Milton	IF the schedule for the vacuum chamber cannot be improved	Then the vacuum chambers will delay the assembly in the MMF and subsequently delay the turn on for the beam through the complete undulator system.	Design, Commissioning	**50%**	**200**	**300**	**400**	**150**	**2**	**4**	**6**	Accelerate the schedule by providing more support/expertise where needed.	Mitigate	• Query the engineers about needs (Mar. 2006) • Provide additional support people as needed to accelerate the schedule (Mar. 2006) • Finalize all testing require to go forward with the full length prototype (April 2006) • Build a full length prototype (July 2006) • Review risk again in detail (July 2006)	
R1.4-026	RF BPM Schedule	3/8/2006	S. Milton	3/8/2006	S. Milton	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.	Design, Commissioining	**50%**	**200**	**300**	**400**	**150**	**1**	**2**	**3**	Accelerate the schedule by providing more support/expertise where needed.	Mitigate	• Query the engineers about needs (Mar. 2006) • Provide additional support people as needed to accelerate the schedule (Mar. 2006) • Get the RF BPM into the injector test stand as soon as possible (April 2006) • Review risk again in detail (May 2006)	
R1.4-027													**0**							
R1.4-028													**0**							
R1.4-029	Quadrupole Temperature Impacts	3/8/2006	S. Milton	3/8/2006	S, Milton	If the adjacent RF BPM is not shielded from the heat of the adjacent quadrupole	Then the RF BPM will detune and stop them from functioning correctly.	Design	**30%**	**500**	**800**	**1000**	**240**	**6**	**8**	**10**	Design a heat shield to prevent heat from the nearby quadrupole from impacting the sensitive RF BPM.	Mitigate, Accept	• Study the impact on the RF BPM of an adjacent heat source (Apr. 2006) • Design a heat shield (May. 2006) • Build and test the effectiveness of the heat shield (June 2006) • Iterate if necessary until a suitable design is found (July 2006)	
R1.4-030	Beam Loss Monitor	3/8/2006	S. Milton	3-8-206	S. Milton	If we do not clearly define soon the entire beam loss monitor system	Then we run the risk of becoming later than we already are.	Design	**50%**	**100**	**200**	**300**	**100**	**2**	**4**	**6**	Get more people working on the beam loss monitor now so that it can be better defined, designed, and engineered.	Mitigate	• Get the engineer in charge to focus more on this project (Mar. 2006) • Insist on a complete design plan by end of April 2006 • Rework the schedule to reflect the work that is foreseen from the design plan (April 2006)	
R1.4-031	Undulator Replacement Shimming	3/8/2006	S. MIlton	3/8/2006	S. Milton	If we do not develop and test an undulator replacement shimming concept soon	Then we run the risk of delaying the measurement process in the MMF	Design	**50%**	**100**	**200**	**300**	**100**	**2**	**4**	**6**	Design and test undulator replacement shimming with the single undulator test set up.	Avoid	• Get the two 1st articles delivered to ANL (March 2006) • Test methods of replacement shimming on the single undulator test setup and with the two 1st article undulators (May 2006)	
r1.4-032	Beam Finder Wire Scanning Algorithm	3/8/2006	S. Milton	3/8/2006	S. Milton	If we do not have the capability to rapidly move and record the position of the beam finder wire in a manner useful for beam physics studies	Then we will need to make modifications to the existing cam mover strategy to allow for this request for beam physics capability	Design	**30%**	**0**	**50**	**300**	**15**	**1**	**2**	**4**	Develop a method to rapidly move and monitor the position of the beam finder wire.	Avoid	• Get better specifications from the physicists as to what is an acceptable way to move the BFW for beam size determination (April 2006) • Determine if we can satisfy this motion with what we already have (April 2006) • Reassess this risk in May 2006	
1.5	**X-Ray, Transport, Optics & Diagnostics System**																			
R-1 .5-001	Solid Attenuator Performance	5/8/2004	R. Bionta	1/2/2006	R. Bionta	IF solid attenuators fail to achieve sufficient or linear attenuation due to damage or physics effects.	THEN at high photon energies, we will be unable to cross calibrate the diagnostic detectors, and we will be unable to operate the direct imagers and the spectrometer.	Commissioning	**10%**	**500**	**1000**	**2000**	**100**	**3**	**6**	**12**	Make solid attenuators out of the lowest Z material, Be. Develop plans to raise pressure in the gas attenuator and to run it with higher z gases.	Mitigate	1) Design low-z solids - Solid attenuator has been designed to be made of Be 2) Develop high pressure / high z gas capabilities in gas attenuator - Ar at 60 Torr will subsitute for solids at 9 keV. We will test prototype operation at 60 Torr with Ar in summer 2006. There remains the concern about how we delever Ar to the attenuator in the FEE as 60% plan calls for only a single N2 line. 3) Locate solid attenuators in low pressure region of gas attenuator to avoid corrosion by N2 gas.	
R-1 .5-002	Gas Attenuator Performance	5/5/2004	R. Bionta	1/2/2006	R. Bionta	If gas attenuator fails to achieve sufficient or linear attenuation due to insufficient pressure with an opening large enough to pass the required beam footprint.	Then, at low photon energies, we will be unable to cross calibrate the diagnostic detectors, and we will be unable to operate the direct imagers and the spectrometer.	Commissioning	**10%**	**500**	**1000**	**2000**	**100**	**3**	**6**	**12**	The low-z solid attenuator provides backup attenuation capabilities though is limited at low photon energies. The risk of poor gas attenuator performance will be investigated by the construction and operation of a prototype gas attenuator consisting of one side of the differential pumping sections.	Mitigate	1) Include low-z solid attenuators in the baseline 2) Construct and operate prototype in spring 2006	

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R-1 .5-003	Imager noise and backgrounds	5/5/2004	R. Bionta	1/2/2006	R. Bionta	If imager noise levels are too high due to high radiation backgrounds, EMP, or high readout rates..	Then we will be limited in our abilities to measure the FEL at low intensities during commissioning.	Commissioning	10%	500	1000	2000	100	3	6	12	Reduction of possible backgrounds will be acheved in the design process by 1) using thin scintillators to reduce the high energy spontaneous radiation, 2) locating the detector downstream of the muon shield, thick slit and attenuators, and 3) providing an x-ray mirror (indirect imager) to reflect the FEL out of the primary beam axis. Spontaneous radiation induced backgrounds will be evaluated using the Monte Carlo simulation. The ultimate mitigation of this risk is to provide alternative detectors in case the above fail.	Mitigate	1) Provide an indirect imager which can be withdrawn in a direction transverse to the beam to lessen Compton background. 2) Provide capability to run cameras at slower readout speeds. 3) Provide a gas ion chamber and total energy detector for alternative means of measuring beam intensity. 4) Locate detectors downstream of thick slit, muon shield, and attenuators. 5) Investigate electrical grounding in FEE.	
R-1.5-004	Small apertures may hinder commissioning	1/6/2005	Richard Bionta	1/6/2006	Richard Bionta	IF the small apertures located upstream of the Commissioning Diagnostics limit our view of the spontaneous radiation or reflections from the undulator vacuum chamber seriously distrots the spontaneous radiation pattern…	THEN, we will possible miss important information in the spontaneous beam that could aid in commissioning, and it may be difficult to convince ourselves that we are looking for the FEL in the correct place in the event that we do not see the FEL signal initially.	Commissioning	25%	1000	1500	2000	375	2	4	12	Carefully study the spontaneous radiation through modeling and simulation to determine the nature of its information content and the effects of small apertures and reflections on the expected patterns. Establish a stay-clear zone from the end-of-undulator to the FEE diagnostics package that allows enough of the spontaneous radiation through as is reasonable without compromising radiation safety.	Mitigate	1) Simulations of spontaneous radiation patterns have been performed (LCLS note LCLS-TN-05-26.) 2) Stay-clear zone has been established ("X-Ray Stay-Clear Apertures from Undulator to FEE", LCLS PRD 1.3-016.) 3) This risk can be retired when the beam line is fully designed from the end-of-undulator to the FEE diagnostics package.	

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R-1 .5-005	Design Immaturity	1/6/2005	Richard Bionta	1/6/2005	Richard Bionta	IF, due to the relative design immaturity of the XTOD instrumentation, large changes in scope are necessary in order for instrumentation to meet requirements…	THEN, it will be difficult to meet the schedule and budget as specified in P3.	Design, Construction	50%	1000	1500	2000	750	2	4	12	Prioritize instrumentation work and R&D so that Commissioning and front-end Diagnostics plans are completed and understood first. Plan on bypassing instrumentation and user tanks with spools to allow early beam transport so delays in tank delivery will not affect CD 4.	Mitigate	1) Prioritize Instrumentation development schedule 2) Early front-end Design 3) Provide adequate contingency for immature designs	
R-1.5-006	Late changes to design due to evolving user requirements	1/6/2005	Richard Bionta	1/6/2005	Richard Bionta	If there are major changes in the scope, performance, existence or placement of XTOD instrumentation after the project is baselined due to evolving user requirements…	Then, it will be difficult to meet the schedule and budget as specified in P3, and the Commissioning and risk mitigation strategies will be ineffective.	Design, Construction, Commissioning	50%	1000	2000	5000	1000	2	6	12	Rigorously Maintain and adhere to the BCR process. Separate user and facility instrumentation geographically, functionally, and temporary. Maintain cost estimates and low-level R&D efforts on instrumentation users are likely to request. Expend resources to investigate possible changes well before initiating BCR process.	Mitigate	1) Adhere to BCR process. 2) Place facility and Commissioning instrumentation upstream of potential users to allow Commissioning activities to proceed during installation of user instrumentation. 3) Delay design of user instrumentation. 4) Maintain cost estimates and low-level R&D efforts on possible user instrumentation such as lenses, mirrors, and pulse length/synchronization schemes. 5) Provide adequate R&D as well as management resources to consider ramifications to Commissioning strategy, risks, and safety of proposed changes before initiating BCR process. 6) Develop accurate, fast, and convenient, computer models of the beam and instrumentation to allow accurate assessment of proposed changes.	
R-1 .5-007	Uncertainties in Power levels, damage thresholds, or physics mechanisms	1/6/2005	Richard Bionta	3/17/2006	Richard Bionta	IF the FEL or spontaneous parameters are significantly different than expected, or materials damage thresholds or mechanisms are significantly different than expected, or physical mechanisms such as attenuation or scintillator emission, are significantly different at FEL intensities than expected...	THEN, measurements of beam parameters may not have sufficient information to commission the FEL	Design, Construction, Commissioning,	50%	500	1000	2000	0	2	4	18	Provide multiple, redundant, measurement techniques for Commissioning that relies on different physical principles. Rely on techniques that minimize or eliminate optical elements upstream of the Commissioning Diagnostics.	Mitigate	1. Baseline three overlapping detection schemes: scintillator/attenuator, mirror/scintillator, and calorimeter for determining FEL parameters during commissioning. 2. Place facility and Commissioning instrumentation upstream of apertures and mirrors to minimize uncertainties in beam transport during commissioning. 3. Baseline both solid and gas attenuators for redundant reduction of FEL power levels. 4. Provide sufficient margin in instrumentation apertures and sensitivities to allow for differences in estimated and actual beam parameters. 5. Develop accurate, fast, and convenient, computer models of the beam and instrumentation response to assure that we are making full use of our current understanding of the expected beam parameters, and to allow us to recognize during commissioning differences in our expectations and the actual beam. 6. Test our models of materials damage thresholds that high intensities, but lower photon energies, at the TTF FEL facility as soon as possible. 7. Encourage users not to initially plan and build elaborate instrumentation based on	X 4-12-2006

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1.6	X-Ray Endstations System																			
R-1.6-001	Laser Timing Failure	5/7/2004	J. Arthur	3/6/2006	S. Moeller	If the desired level of synchronization is not achieved	Then the precision of experiments and diagnostics will be compromised	Operations	10%	100	200	300	20	0	1	2	Study recent results at SPPS and implement these results into the LCLS design.	Mitigate	1. Study recent results at SPPS (End of 06). 2. Continue to monitor progress at SPPS (06/07). 3. Assign appropriate resources (e.g., control and laser engineer) to focus on laser timing and identify risks related to LCLS (planned during FY07).	
R-1.6-006	2-D Detector Failure	5/7/2004	J. Arthur	3/11/2005	S. Moeller	If the 2-D X-Ray Detector fails to meet its technical requirements by 9/28/08	Then the goal of developing this useful instrument will not have been met	Operations	30%	1000	1000	1000	300	0	0	0	Begin detector R&D immediately. If R&D results are not promising, pursue acquisition of alternative detector, with less aggressive specifications, in FY07.	Mitigate	1. R+D work starts early FY05 2. Review after 1st and 2nd year 3. Decision about continuation of program after 2nd year review (end of FY06) 4. In case R+D program is stopped: 5. Start with procurement of alternative detector (specifications will be determined earlier).	
R-1.6-008	Pricing fluctuations for procurement items	4/1/2005	S. Moeller	4/1/2005	S. Moeller	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	Construction	25%	0	1,000	>5000	250	0	0	0	Monitor prices of main procurement items and allow sufficient contingency	Accept	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. Present changes to Project Office for possible BCRs. SCHEDULE FOR STEPS: Monitor prices beginning of FY06; For start of procurements at the end of FY06 thru mid of FY08.	
R-1.6-009	Scope uncertainties due to evolving requirements early in the design phase of the Atomic Physics Instrument	3/16/2006	S. Moeller	3/16/2006	S. Moeller	IF there are major scope changes for being able to provide a complete atomic physics instrument	THEN the actual cost for this instrument will be higher than our current cost estimates	Construction	30%	1,000	3,000	5000	900	0	0	0	Begin detailed plan for atomic physics station as soon as possible, notify Project Office of scope changes early through the BCR process.	Accept	1. Start with defining the science and specifications in March 06 2. Develop a concept design and cost estimate by May 06 3. Notify Project Office early via a preliminary BCR	
1.9	Conventional Facilities																			
R-1.9-002	Bay Area Labor Construction Cost	5/7/2004	David Saenz	1/23/2006	David Saenz	If the Bay area economy experiences rapid economic growth, to levels see 5-10 years ago.	Then Bay area labor force may experience an increase in demand that can result in a greater labor cost than currently estimated.	Construction	5%	>5000	5000	>5000	250	0	0	0	Monitor trends for bay area construction activities	Avoid, Accept	Review and track various resources for bay area construction activities, specifically labor costs. Develop quarterly reports and present economic trends to the LCLS Project Office	
R-1.9-004	Construction Schedule	5/7/2004	David Saenz	1/23/2006	David Saenz	If the average tunneling rate, using road header boring, is not maintained	Then the minimal tunneling advances will experience a schedule delay and impact the overall schedule of beneficial occupancy milestones	Construction	25%	<5000	5000	<5000	1250	3	3	3	Closely monitor all major activities and proactively seek improvements to the CF schedule. Call an early review with outside experts to optimize the LCLS construction schedule.	Avoid, Accept	Review all critical patch activities, place all tunneling and excavation operations onto the critical path, increase of necessary manpower, and make provisions for additional equipment (road headers)	
R-1.9-008	Seismic activity during construction	5/7/2004	David Saenz	1/23/2006	David Saenz	If a moderate earthquake occurs during tunneling operations	Then a life/safety issue may cause possible accidents or schedule delays	Design, Construction	25%	<1000	1000	<1000	250	<3	<3	<3		Mitigate	Provide construction design to peer review, submit final design to SLAC Seismic Safety committee for review and approval	
R-1.9-016	Changes to Title II Design Baseline Scope	4/21/2005	David Saenz	3/13/2006	David Saenz	IF during Title II there are changes to the baseline design	THEN there is a high probability that significant increases to the cost of design and a potential impact to the schedule completing design.	Design	25%		1000		250	0	2		Continually review and validate design with System Managers	Accept	• Coordinate with System Managers during the design phase (Schedule for Steps: 4/05 - 11/05) • Submit 30%, 60% and 90% to System Managers for approval (Schedule for Steps: 6/20, 8/29, and 10/24) • Changes by System Managers to be routed to Project Office for approval	

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R-1.9-020	S20 Construction Safety	5/18/2005	David Saenz	3/13/2006	Bob Law	IF there is a SLAC accident during the course of the Sector 20 Injector Facility construction project	THEN there is a strong possibility that the S20 project will be shutdown as well	Construction, Commissioning	5%		1000		50	1			Provide LCLS independent Safety Program for Sector 20 Injector Facilities	Mitigate	• Develop a project specific safety program (Schedule for Steps: 7/05) • Select general contractors and their subcontractors with a mod rate of <.81 (Schedule for Steps: 5/05) • Selection of contractors based on safety records and previous experience (Schedule for Steps: 5/05)	
R-1.9-021	MMF Beneficial Occupancy	5/18/2005	David Saenz	5/18/2005	Javier Sevilla	IF the beneficial occupancy date is not met	THEN a delay to the beneficial occupancy of the facility will be realized and would also adversely impact the testing (commissioning) program of the customer. This would potentially also cause an impact to the beneficial occupancy of the Undulator Hall.	Construction, Commissioning	1%	<1000			0	0	0	0	Provide prequalification for general contractors and subcontractors	Mitigate	• Control external factors that will affect the performance of the contractors (Schedule for Steps: 5/05) • Selection of well qualified contractors and subcontractors with proven historical success (especially mech and elect) (Schedule for Steps: 5/05)	
R-1.9-022	MMF Construction Safety	5/18/2005	David Saenz	3/13/2006	Javier Sevilla	IF there is a SLAC accident during the course of the MMF construction project	THEN there is a strong possibility that the MMF project will be shutdown as well	Construction, Commissioning	5%	<1000	1000		50	1			Provide LCLS independent Safety Program for MMF	Mitigate	• Develop a project specific safety program (Schedule for Steps: 7/05) • Select general contractors and their subcontractors with a mod rate of <.81 (Schedule for Steps: 6/05) • Selection of contractors based on safety records and previous experience (Schedule for Steps: 6/05)	
R-1.9-023	MMF Facility Requirements	5/18/2005	David Saenz	5/18/2005	Javier Sevilla	IF the tight temperature and low vibration stability requirements are not achieved	THEN a delay to the beneficial occupancy of the facility will be realized and would also adversely impact the testing (commissioning) program of the customer. This would potentially also cause an impact to the beneficial occupancy of the Undulator Hall.	Construction, Commissioning	1%	<1000			0	0	0	0	Heavy oversight during construction	Mitigate	• Constructability reviews of the drawings and specifications requiring strict compliance (Schedule for Steps: 5/05) • Selection of well qualified contractors and subcontractors (especially mech and elect) (Schedule for Steps: 5/05) • Compliance verification of all the technical requirements of the contract documents (Schedule for Steps: 12/05) • Implement an effective commissioning plan (Schedule for Steps: 3/06)	
R-1.9-024	UH Tunnel Geology	8/9/2005	Dick McDonald	1/23/2006	David Saenz	IF insufficient ground cover at E. End UH tunnel for normal excavation	THEN, additional ground support will be installed to facilitate tunnel excavation	Construction	20%	50	100	200	20	<1	<1	<1	Install additional ground support	Mitigate	Install additional ground support as tunnel is excavated (Schedule for the steps: during excavation)	

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R-1.9-025	Linac Legacy Issues	1/5/2005	Dick McDonald	1/30/2006	David Saenz	IF the condition of the existing SLAC Linac infrastructure does not support LCLS requirements	THEN the LCLS will not be able to operate the new beamlie components required to meet electron beam delivery parameters	Design, Construction	25%	1000	5000	7500	1250	4	6	9	Mitigate risk by upgrading SLAC Linac infrastructure prior to commissioning Linac	Mitigate	1. Specified utilities requirements provided to Conventional Facilities. 2. Generate plan to upgrade utilities to requirements. 3. Perform upgrades during 2006 shutdown	
R-1.9-026	Rad Contamination	1/23/2006	Dick McDonald	1/23/2006	Bob Law	IF rad contaminated soil exists under FFTB beam dump	THEN, additional costs will be incurred to remove material	Construction	25%	50	100	200	25	<1	<1	<1	Remove contaminated soil under HAZMAT protocols	Mitigate	Procure removal by experienced HAZMAT contractor	
R-1.9-027	Spoil Location	1/23/2006	Dick McDonald	1/23/2006	Bob Law	IF excavation spoils are not placed adjacent to the work area	THEN, there will be a cost increase to load and haul to outlying areas.	Construction	25%	750	1000	1250	250	<1	<1	<1	Design spoil location and obtain approvals	Mitigate	Design spoil location and criteria, present to Architectural Committee for approval and obtain construction approvals	
R-1.9-028	In place Utility Protection	1/23/2006	Dick McDonald	1/23/2006	Bob Law	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	Construction	1%	100	500	1000	5	<1	<1	<1	Require detailed submittals for utility protection and close monitor implementation of plan.	Mitigate	Require submittal of plan, approve submittals, enforce submittal requirements	
R-1.9-029	Delta Between Jacobs Engineering and Turner Cost Estimates	2/24/2005	David Saenz	2/24/2005	David Saenz	IF the Turner report cost estimate is correct	THEN the CF budget will need to be readjusted to increase by ~ $7M	Construction	25%		5000		1250	0	0	0	Continually review and validate the cost estimate against local contractor conditions.	Mitigate	Increased contingency assessment for the RY-CLOC construction Phase. Will RE-evaluate the estimated construction cost at the o 30% and 60% T2 phase with JE as well as the CM/GC	
R-1.9-030	CF procurements	2/24/2005	Dick McDonald	3/13/2006	David Saenz	If CF procurements, change orders, and contract modifications are not coordinated and expedited in a timly manner.	THEN the project will be impacted by the delays in contractor performance thereby causing overall delay to the project completation.	Construction	25%		5000		1250		2		CF Procurement Process	Mitigate	Develop stragety to analyze global CF procurement scope. Determine if current staff is sufficent to perform tasks as required. Develop approval process to ensure timely and sufficent responces to support CF construction requirements.	
R-1.9-031	Title III Services	2/24/2005	Dick McDonald	3/13/2006	David Saenz	If level of support is inadequate to support construction activities.	THEN project will encounter schedule delays and cost increases due to insufficient timley support.	Construction	25%		2000		500		2		Title III Support	Mitigate	Negociate Title III services with Jacobs prior to mobilization to provide support. Monitor Support to ensure adequate for needs. Modify support requirements as required to meet needs.	
R-1.9-032	CF Staff Support	2/24/2005	Dick McDonald	3/13/2006	David Saenz	IF additional staff are not hired in a timley manner	THEN staff will not be suficient to support project needs.	Construction	1%		200		2	0	1		CF Staff Support	Mitigate	Fill current opening with individual that has heavy civil exerience. Backfill as position becomes available with individual that has heavy civil experience.	
R-1.9-033	UTR Support	3/13/2006	Dick McDonald	3/13/2006	David Saenz	IF UTR staff are not available a timley manner	THEN UTR staff will not be suficient to support project needs.	Construction	10%		200		20	0	1		CF Staff Support	Mitigate	Discuss with CEF and implement plan to insure needed support.	
R1-9-034	FFTB Decommission	new																		
								1.1	Totals for Project Office / Controls				1,630							
								1.2	Totals for Injector				956							
								1.3	Total for Linac				500							
								1.4	Total for Undulator				1,600							
								1.5	Total for XTOD				2,425							
								1.6	Total for XES				1,150							
								1.9	Total for Conventional Faciliteis				6,672							
												GRAND TOTAL	14,933,000							