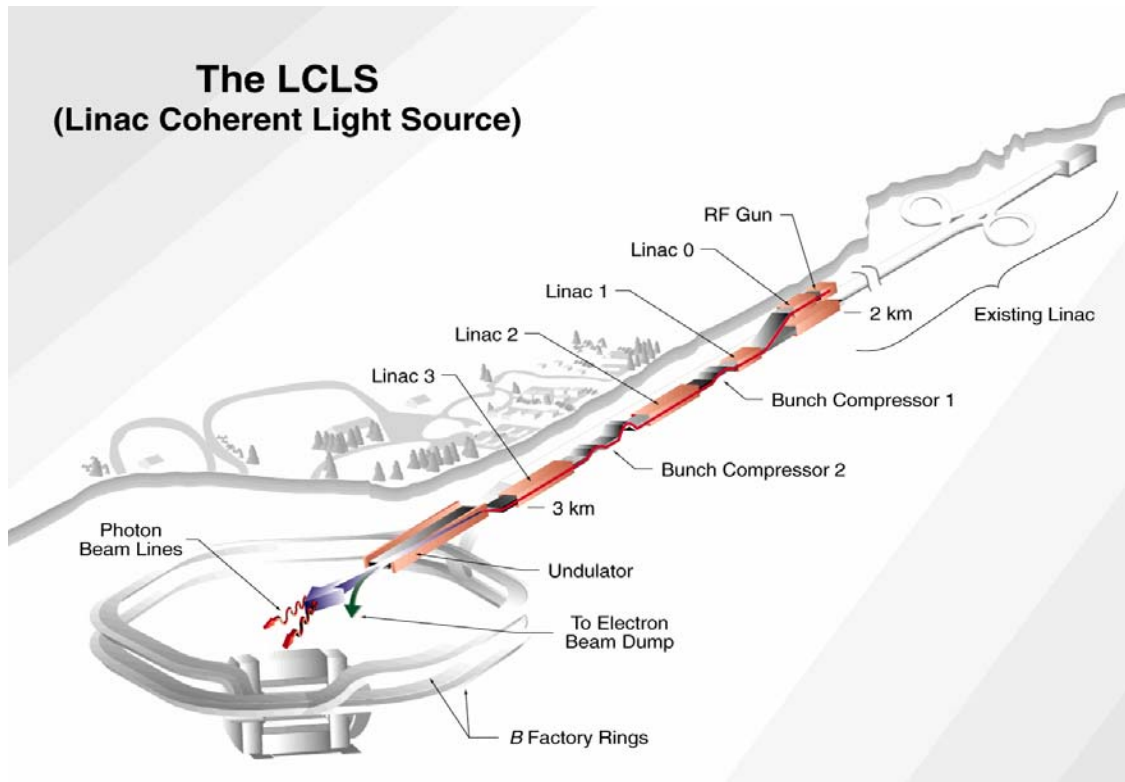


Response to Recommendations of the Aug10-12, 2004 DOE Review Committee for the LCLS Project

November 8, 2004



Action Items

1. ***Re-evaluate the project's proposed baseline cost and schedule, and submit a revision to DOE/SC by October 15, 2004***

A revised cost and schedule estimate including contingencies has been prepared and presented to the DOE Office of Science BES. The revised cost and schedule estimate will be presented at the CD-2b "Delta" Review scheduled for November 12, 2004.

2. ***Initiate weekly project conference calls between LCLS, the DOE Stanford Site Office, and the Office of Science in August 2004;***

Weekly teleconferences have been held weekly since the August review.

3. ***Conduct the next DOE Review in February/March 2005.***

Agreed. Dates for the next review have been discussed in the abovementioned teleconferences.

Recommendations for Project Management

PROCUREMENT

- ***Review and revise the procurement process lead times for the Long Lead procurements and Civil Construction procurements. Complete by 15 Sept 04.***

Lead times for Long Lead Procurements have been reviewed and modified by the cognizant Procurement Manager (Technical, Construction), and the schedule now reflects their input.

- ***Review, revise and approve all required Advance Procurement Plans for Long Lead Procurements scheduled for FY05. Complete by 1 Oct 04.***

LCLS has the following status for its LLP Advanced Procurement Plans;

- Project Management PMCS Award (APP approved, RFP out for bid)
- Injector Drive Laser (APP approved, RFP out for bid)
- Linac BC1, BC2 Magnets (APP in draft)
- Linac RF X-Band (APP in draft)
- Undulator Magnet Blocks (APP in approval process)
- Undulator Magnet Poles (APP in approval process)
- Undulator Titanium Strongbacks (APP in approval process)
- CF Magnetic Measurement Facility (APP in approval process)
- CF Sector 20 Laser Bay (APP in approval process)

- ***Coordinate the reassignment of the Laboratory procurement staff by the Laboratory procurement management directly to the project. Complete by 15 Sept 04.***

LCLS management has requested, and the SLAC Directorate has agreed, to provide a dedicated procurement cell for the LCLS Project at SLAC. The LCLS Procurement cell will be co-located with LCLS management team to facilitate the procurement process. The procurement cell will be made up of a four-person procurement support team (Procurement Manager, Construction Contracts Lead, Technical Contracts Lead, Administrative Aide) which report to the SLAC Associate Director for Business Services.

In addition, LCLS management is acquiring specialized consulting services with experience in dedicated procurement cells and construction contracts for large DOE-funded projects.

LCLS will continue to utilize a decentralized procurement strategy using each partner labs' procurement staff to manage and award their respective deliverables. At SLAC, LCLS will continue to use the SLAC Purchasing Group for many of its commodity purchases, thereby freeing up the dedicated LCLS Procurement Cell for the more critical procurements.

- ***Expedite the completion of Long Lead procurement items designs and issuing of procurement bid packages. Complete by 1 Oct 04.***

LCLS continues to expedite its designs in the Injector, Linac, Undulator and Conventional Facilities System to stay to schedule. Currently, the LCLS has Advanced Procurement Plans (APP's) for the following Long-Lead Procurements;

- Project Management PMCS Award (APP approved, RFP out for bid)
- Injector Drive Laser (APP approved, RFP out for bid)
- Linac BC1, BC2 Magnets (APP in draft)
- Linac RF X-Band (APP in draft)
- Undulator Magnet Blocks (APP in approval process)
- Undulator Magnet Poles (APP in approval process)
- Undulator Titanium Strongbacks (APP in approval process)
- CF Magnetic Measurement Facility (APP in approval process)
- CF Sector 20 Laser Bay (APP in approval process)

- ***Expedite the development, review and approval of the project Construction Manager Statement of Work and procurement bid package to meet project need date. Complete by 1 Nov 04.***

The Construction Manager Statement of Work (SOW) is in draft form and will be reviewed by Subject Matter Experts (SMEs) and/or consultants in the next month. The final SOW is scheduled for November 30, 2004.

- ***Revise Advance Procurement Management Plan to make Project Procurement Lead responsible for the maintenance of the Project Procurement Tracking System. Complete by 1 Oct 04.***

The Advance Procurement Management Plan (APMP) has been revised to make the Project Procurement Lead responsible for the maintenance of the Project Procurement Tracking System. The APMP is also being revised to reflect the LCLS dedicated cell and separate authority levels. The final version of the APMP is expected to be complete with signatures by December 15, 2004.

- ***Re-evaluate the overall project costs and schedule by October 15, 2004, based on the Review Committee concerns associated with the limited project staff on-board now and early in FY-05 and due to the aggressive schedule for the project.***

A revised cost and schedule estimate has been prepared and presented to the DOE's Office of Science-BES. The revised cost and schedule estimate will be presented at the CD-2b "Delta" Review scheduled for November 12, 2004. The revised baseline assumes that an appropriations bill is passed in January 2005. Staffing ramp-up and long-lead procurements are re-scheduled consistent with this scenario.

- ***Develop a comprehensive project management staffing plan and work with the SLAC management to implement this plan within the first quarter of FY-05.***

A comprehensive project management staffing plan has been prepared and presented to the DOE Office of Science BES. The staffing plan will be presented at the CD-2b "Delta" Review scheduled for November 12, 2004.

- ***Reconsider the risks associated with implementing the OPC activities and the need for an OPC management reserve by October 15, 2004.***

The OPC Management Reserve has been increased from \$500K to \$5M. This is included in the revised cost and scheduled estimate presented to the DOE Office of Science BES, which will be reviewed at the CD-2b "Delta" Review scheduled for November 12, 2004.

- ***Implement a uniform level of project controls for SLAC and the partner laboratories by the next SC Review.***

LCLS has established an integrated cost and schedule system with a critical path. The LCLS Earned-Value Management System (EVMS) and Change Management is in and operating uniformly across the project. Technical Addenda to the ANL and LLNL Memoranda of Understanding are based upon the approved scope of work as captured in the LCLS cost and schedule database. Accrual reporting routines have been developed and are being tested.

- ***By October 15, 2004, based on concerns associated with attracting key personnel and developing new areas of needed expertise for the LCLS Project, the SLAC Director should communicate the long term importance of the LCLS Project and its scientific program to the SLAC staff as part of the future vision of SLAC. This information will support the LCLS Project staffing plan and the need to encourage the necessary talent to participate in the construction and operation of the LCLS.***

The heightened visibility of the LCLS Project at SLAC is evident in the very satisfactory staffing of the controls/computing group by SLAC personnel. Support is improving in the area of low-level RF and mechanical engineering, though some key personnel are not yet identified.

- ***For the next SC Review there needs to be an agenda item on the role of the LCLS at SLAC and the operation of the LCLS in 2010 and beyond.***

Agreed. The role of LCLS at SLAC and the operation of LCLS in 2010 and beyond will be presented at the next SC Review.

Risk Assessment

- ***Continue to enhance the risk assessment process and utilize the risk assessments when evaluating available contingency. Consider reviewing/updating the Risk Registry monthly, instead of semi-annually.***

Agreed. Risk assessment will be reviewed/updated monthly rather than quarterly as part of the regular LCLS Monthly Management Meeting. Identified risks of sufficient magnitude (identified in the LCLS Risk Management Plan) will be captured in the Risk Registry.

SCHEDULE

- ***Reevaluate the schedule and schedule contingency based on the recommendations and findings in this report and provide an updated schedule to DOE by October 15, 2004.***

A revised cost and schedule estimate including contingencies has been prepared and presented during the BES/LCLS weekly teleconferences. The revised cost and schedule estimate will be presented at the CD-2b "Delta" Review scheduled for November 12, 2004.

- ***Reevaluate near term critical procurement plans to reflect realistic procurement start dates and durations.***

Lead times for Long Lead Procurements have been reviewed and modified by the cognizant Procurement Manager (Technical, Construction), and the schedule now reflects their input.

- ***Analyze conventional construction contracting durations to accommodate potential complexity of the work.***

The preconstruction activities (i.e. pre-selection, RFP, bid phase, Proposal Review by the Evaluation Board, DOE review/approval, and subcontract award, etc), have been revised to incorporate a more realistic duration for these activities. Current schedule provides a duration of nearly five months between RFI and award.

Recommendations for Injector / Linac

- ***Proceed with long lead procurements as per the baseline plan for the linac and injector acceleration hardware. (Q3 FY05). However, SLAC should assign a specific procurement person to carry out these key long lead procurements. (Q1 FY05)***

The LCLS Procurement Manager has been assigned the responsibility of ensuring that the key long lead procurements are awarded in accordance with the schedule as identified in the APP.

- ***Conduct a detailed review of the photo-gun drive laser design with a panel of laser experts. (Q3 FY05) Perform a complete set of risk reduction experiments on pulse frequency conversion with shaped pulses using the capabilities at BNL. (Q1 FY05) Both actions should be performed prior to awarding of the contract for the drive laser. (Q3 FY05)***

The above dates were in error. The Q3 FY05 date should be Q1 FY05, and the drive laser contract will be awarded in Q2 FY05 (Jan 2005).

A Technical Design Review of the Injector Drive Laser was conducted on July 21, 2004 at SLAC. The committee members are Chris Barty (LLNL, Chair), Marcus Babzien (BNL), Roger Falcone (Berkeley) and Yeulin Li (ANL/APS). The written report is not yet available; however the committee does endorse the drive laser technical approach and the procurement plan.

The risk reduction experiments on pulse frequency conversion with shaped pulses at BNL/NSLS began in August, 2004. The Dazzler pulse shaper is installed and the unamplified pulses have been shaped. After careful characterization of the shaped oscillator pulses, the pulses will be amplified and frequency converted. The results of these experiments will be used to define the drive laser design before the award of the contract in Q2 FY05.

- ***Identify target individuals in the RF technology area and controls area within SLAC and obtain explicit management support to retask these individuals for injector/linac development. (Q1 FY05)***

An LCLS Controls group has been established at SLAC comprised of personnel from the LCLS Division (direct) as well as other SLAC Division (matrixed). Currently, the Controls group has identified personnel to support; SLC Integration, Timing, Power Supplies, Low-Level RF, Diagnostics, Cabling and High-Level and Low-Level Software Applications. Additional support is still needed in Low-Level RF and Protection Control Systems (MPS, PPS, BCS). LCLS is working with SLAC management to identify these resources.

- ***Aggressively seek to hire a laser technology team to oversee all laser activities, both in the injector project but also in the endstation area lasers. Greater involvement by laser scientists from LLNL should be sought to augment further any in-house expertise which is developed at SLAC. (Q2 FY05)***

LCLS has posted a job requisition for a full-time laser group leader. LCLS has begun to inform potential candidates of the availability of a Laser Group Leader opening in the LCLS organization in the near future.

Recommendations for Undulator

- ***Expedite acquisition of article 1. This will allow for early contact with assembly vendors, the opportunity to incorporate corrections in assembly based upon magnetic measurements, and early commissioning of the magnetic measurement facility at SLAC. This should occur early in FY05 to allow delivery by end of FY05.***

Agreed. As stated during the review, by going forward with the acquisition of the 1st article undulator during FY05 we can significantly reduce the risk to the delivery of the undulator. The LCLS Undulator team plans to first analyze the cost impact to the project followed by a replanning of the schedule and budget authority. A baseline change request will then be made and submitted to the LCLS management for approval. We will then go forward with the recommendation following approval of the BCR.

- ***Expedite system integration design/plan of a full module over the next year. The system integration plan currently assumes that the undulator design is essentially frozen. Other components must accommodate fit around it. The vacuum chamber is the most significant component affecting system integration. A complete module should be assembled before procurement of the vacuum system is initiated. This needs to occur within FY05 to accommodate the planned FY06 production.***

Agreed. This has been discussed informally, but will now be made explicit in our work scope plan. A revised plan will be developed to show a complete system integration mockup of the one undulator module, defined as at least one undulator, its support system, the vacuum system and related diagnostics sections. This will be planned to occur in FY05.

- ***Finalize choice of quadrupole type. This needs to occur by the end of FY04, or very early in FY05, in order to accommodate required facilities changes.***

Electromagnetic quadrupoles has been chosen as the baseline design for the undulator system. Currently the exact performance specifications for the electromagnetic quads are being defined and documented in the revised PRD 1.4-001 "General Undulator System Requirements".

- ***Incorporate stretched wire based field integral measurements for each article in magnetic measurement plan.***

At present, LCLS feels that the set of measurements planned is sufficient. Following the recommendation of the committee, we will investigate whether a stretched-wire measurement offers any additional or complimentary information that justify the additional cost related to the integral field measurements.

- *Make sure that experience in magnetic measurements of first articles is incorporated into necessary modifications of assembly procedures.*
Agreed.

Recommendations for X-Ray Transport

- ***Undertake a set of experiments to test the simulation codes against experimental data. This reviewer speculates that opportunities for experiments may exist at the DESY FEL, the Z-pinch Source, and the National Short Pulse Laser Facility. Tests of the codes at wavelengths longer than 1.5 nm should still be useful since it appears likely that the physical processes that should be simulated will still be important. These experiments should be done before the procurement of the major optics like the flipper mirror. A suggested schedule is to make the plans in calendar year 2004 and conduct experiments in 2005.***

LCLS will continue to pursue experimental verification of our damage estimates for the LCLS optics. To date we have attempted 3 experiments, one at JanUSP at 800 nm, one with the Comet X-Ray Laser at 80 nm, and one with the SPPS at 0.14 nm (8.9 keV). These experiments were inconclusive due to either the energy coupling mechanism (JanUSP), or lack of adequate beam fluence and stability (Comet and SPPS).

The DESY facility is planning damage experiments at 60 nm in June 2005, and again in December 2005. The 60 nm DESY FEL beam is the closest match to the LCLS as far as pulse-length and fluence although the x-ray attenuation lengths are still at least one order of magnitude different. LCLS will watch these experiments carefully and participate in them if possible. LLNL physicists working on LCLS damage issues visited DESY in August 2004 for discussions on the FEL experiments. We will make plans for further participation in these experiments based on these discussions.

- ***Schedule regular meetings between LCLS management and LLNL management. These should be at a higher management level than Arthur and Bionta.***

Regular meetings have been initiated between PAT I-Division Leader Jim Brase and LCLS Project Director John Galayda and/or LCLS Chief Engineer Mark Reichanadter. It is planned that these meeting will be held on a monthly basis, preferably at LLNL.

- ***Formalize and document the relationship with CHESS and set milestones with them for the 2-D detector.***

Any collaboration between SLAC and Cornell-CHESS to develop a 2-D Pixel Detector for the LCLS is dependent upon funding and initial design studies and R&D results in FY2005-2006. A one-year R&D program will be formalized with an MOU between SLAC and the institution doing the development. Contingent upon meeting specific milestones, this R&D program will be extended for a second year. Then, based on the results of the R&D program, a decision will be made about whether to proceed with a final development stage resulting in a prototype detector for LCLS, or instead to procure a prototype detector with another technology from a different source.

Recommendations for Conventional Facilities

- ***Task, specify, and procure a Construction Manager for the LCLS project as soon as possible. The Construction Manager should hold the contract for the execution of the major civil construction contract that includes the underground tunnel extension, the underground experimental areas, and the above grade tunnels and buildings. The Title 3 cost estimate for the Construction Manager should be increased.***

The Statement of Work (SOW) for the Construction Manager (CM) for LCLS is underway and the highest priority for the LCLS Conventional Facilities group. The Title 3 cost estimate has been increased and is in agreement with CM costs for similar scientific research projects. A procurement strategy for the CM has also been developed and documents are being prepared. Currently, LCLS plans to award the CM in late May 2005 with the start of construction scheduled for March 2006.

A revised cost and schedule estimate including revisions to the LCLS CM function have been prepared and presented to the DOE Office of Science BES. These revisions will be presented at the CD-2b “Delta” Review scheduled for November 12, 2004.

- ***Add time to the overall project schedule to increase the float to completion.***
Additional float has been added to the construction schedule. The original schedule of 24-27 months has been increased to 30 months.
- ***Re-evaluate the estimate for the civil contingency.***
Contingency on the LCLS Conventional Facilities has been increased from 20.5% to 46.3%. This additional contingency reflects risks associated with the underground tunneling and cavern construction as well as uncertainties in commodity prices such as concrete and steel.

A revised cost and schedule estimate including revisions to the LCLS CF contingency assessment has been prepared and presented to the DOE Office of Science BES. These revisions will be presented at the CD-2b “Delta” Review scheduled for November 12, 2004.

- ***Consider merging the proposed two small contracts named “S20” and “MMF” into a single construction task.***
LCLS plans to bid S20 and the MMF concurrently, but separately. Bidders will be encouraged to bid on either project, or both. Selection will be made based on best overall value. The details of this strategy are laid out in the Advanced Procurement Plans for both the S20 and the MMF.
- ***Check that the ES&H flow down clauses to be inserted in Construction Management, general contractor, and subcontractor contracts are consistent***

with the expectations of the DOE as found at other recent major DOE Office of Science construction projects.

SLAC's Construction Terms and Conditions were revised and approved by DOE in October of 2003. At the time of this revision, additional requirements were added to the Safety, Environmental Protection and Health Article in order to remain current with applicable regulations. When compared, the language in SLAC's ES&H Safety Article, as stated in our Construction General Terms and Conditions, is consistent with clauses incorporated into Construction Terms and Conditions used by other Department of Science National Laboratories.

- ***Continue Title 2 work as rapidly as possible after funding and approvals are obtained.***
Title II is funding restrained, and will commence as soon as the FY05 funding is approved.
- ***Conduct technical reviews by the Project technical staff of the Title 2 work at both the 40% complete and 65% complete points. Any delay beyond the 65% point will be impractical to affect the final Title 2 design.***
The LCLS CF office will continue to maintain a close relationship with the project technical staff. A minimum of two reviews with the project technical staff (excluding 100% review) are planned, and it is agreed that reviews beyond the 65% maturity have diminished value. In addition, a second value engineering session (including the project technical staff) will be conducted.
- ***Define the contractor lay down areas required and their locations. This should be included as an amendment to the Title 1 drawings. Also receiving and warehouse locations should be noted.***
The location of the lay down area and receiving facilities will be evaluated by the CM firm during Title II. On an interim basis, the contractor lay down area will be reviewed by the CF office and on-site facilities will be evaluated for warehouse and receiving capacities and availabilities.
- ***Consider construction of a full scale test mock-up of the undulator hall to test the constructability and performance of the undulator hall floor stability design. The length (say 30 feet?) should be chosen to be sufficient to check constructability issues and evaluate the design performance.***
Due to the anticipated schedule for start of construction and timing of funding, it does not appear that a 30' full scale mock-up of the Undulator Hall is feasible. Additionally, there is a concern that end effects would introduce uncertainties into the mockup that would not be present in the full design. The CF group will review other accelerator and light source projects to review floor designs where critical components require similar conditions as the LCLS project.

Recommendations for ES&H

- ***Bring on board a full time dedicated ES&H professional with a construction background. This individual should be in place by October 31, 2004. This will allow ES&H integration and support for the Title 2 phase of the project.***

A job posting for the LCLS ES&H coordinator has been opened. ES&H review of Title-II designs will be carried out by the person filling this post, supplemented by contract consultants as necessary.

- ***Execute a plan, which allows LCLS management to take a more active role in developing the safety plan, and execution of the safety program after construction begins.***

The LCLS will continue integrating safety into the project at all levels. We will re-emphasize to staff the concepts that ISMS are based on and develop a plan that denotes at the system level how safety is integrated into the LCLS project.

- ***Develop a LCLS specific Construction Safety Plan (CSP) with Integrated Safety Management (ISM) at its core, incorporating SLAC ES&H work smart standards, OSHA standards, DOE standards as well as specific construction best practices. A document should be in place prior to letting the first contract bid package.***

This recommendation has yet to be completed. It will be the intent of the LCLS to develop this document over the coming months and have it in draft form by April/May FY2005. It is contingent on having a full time LCLS safety person on board as s/he would be responsible for its development, implementation and enforcement.

- ***Review SLAC's contract/procurement packages to assure that all LCLS ES&H requirements are included in the bid documents.***

SLAC's ES&H requirements are included in all LCLS Procurements "Terms and Conditions" Section. These are currently reviewed by B. Todaro and J. Adams from SLAC Purchasing Group but will soon fall under the purview of the LCLS dedicated procurement cell.

- ***Develop a contractor pre-bid and pre-construction LCLS ES&H orientation. December 2004.***

Agreed. LCLS plans to build on established SLAC site access requirements that provide new and existing personnel with an overview of the environment, safety, and health issues, programs, and resources at SLAC. These issues, in addition to the LCLS-specific ES&H topics that encompasses project expectations and construction related activities will be addressed during the pre-bid and pre-construction orientations.

- ***Develop an ES&H procedure to be included in the Construction Safety Plan (CSP), as well as a QA/QC process for the partner laboratory's equipment and their employees (coming to SLAC) to assure compliance with LCLS' requirements.***

Agreed. A formal work planning procedure will be developed that outlines the requirements that off-site staff and equipment need to go through before work authorization on the SLAC site is granted. It will be consistent with the site Safety Management System and SLAC work planning policies.

- ***Review the need for dedicated Laser Safety Officer (LSO) to support the LCLS' safety team.***

As of April 2004, LCLS assigned Sasha Gilevich as the Laser Safety Office for the LCLS Injector Drive Laser. The LCLS will review the scope of laser use during LCLS operations in consultation with the present SLAC Laser Safety Officer and make a determination as to the whether the existing Laser Safety Officer structure at SLAC can handle the increased work load, or whether a different structure needs to be developed. It is likely that the SLAC LSO will be augmented by an LCLS specific LSO.

- ***Review LCLS' future safety requirements, Industrial Hygiene, Environmental, and the expected support from SLAC's ES&H team.***

In consultation with the SLAC ES&H Division, a determination will be made based on anticipated workload during the coming years, whether the SLAC ES&H infrastructure can safely handle construction, commissioning and operations of the LCLS in the foreseeable future.

- ***Explore using an Owner Controlled Insurance Program (OCIP) instead of contractors supplying Workers Compensation insurance. This is a potential saving for the owner who would normally higher pay costs, which is passed on by the contractor in their bid. By December 2004***

Rachel Klaus (University Counsel at SLAC) is investigating the possibility of using an OCIP. She will advise LCLS management prior to December 31, 2004.

Recommendations for Controls

- ***Complete the transfer of Global Controls elements to WBS 1.1.3.1 and WBS 1.1.3.5 in both the WBS Dictionary and the detailed cost estimate spreadsheets by October 1, 2004.***

The WBS transfer of Global Controls is complete. The modification of the WBS dictionary will follow.

- ***Identify and hire the controls liaison people for WBS 1.5.2 and WBS 1.6.2, and work with them to complete the scrubbing of those WBS elements, assuring standardized approaches where appropriate.***

Richard Bionta, John Anderson, and Bob Dalesio have met and agreed to collaborate on the hiring of the 1.5.2 and 1.6.2 controls system liaisons. Due to funding concerns related to the continuing resolution, these hires have been delayed but will be revisited once full FY05 funding is available.

- ***Establish an approach to the integration (or not) of conventional facilities controls; and identify a controls liaison person for WBS 1.9 if integration is to be pursued.***

An initial discussion was held with the Architect/Engineer (Jacobs Engineering) and CF System Manager (David Saenz) to make a clear case for the integration of the facility control into the global control system. The critical requirement for time stamped data must be within 500 msec signal readout was defined. The CF controls liaison is Mario Ortega.