

# Facility Advisory Committee Closeout

- General Comments
- Conventional Facilities
- Controls Subgroup
- Photon Subgroup
- Electron Subgroup

## Management

- It is good that the LCLS Project Director is considered part of the SLAC Directorate and they meet daily
- Lower level integration and priorities associated with LCLS must be communicated and emphasized by SLAC Directorate
  - That is resource needs such as Engineering/Technical

## Engaging in *Boost Phase*

- Good progress since last time
- Accommodating many aspects of the gradient
  - Good staffing increase rates
  - Good incremental progress since last FAC Meeting
- Holes exist in boost phase
  - Some items are lagging
  - Many near-critical are clear within the project
  - Involvement of graduate students in select areas (lasers, x-ray systems)

## Organization

- It's no longer *baroque*, ... but we suggest you fix it
  - Lasers in photon arena (cf. Electron subgroup)
  - Controls visibility (cf. Controls subgroup)
  - Explicit coordination across all instruments

## Descoping

- Be very careful before accepting irreversible changes
  - A 20 meter shorter tunnel for \$500k may be very expensive savings
- The approach to descoping seems appropriate

## Progress Monitoring

- Milestone density: Is it sufficient at the lowest level?
  - Level 1 = 0.9 milestones/year
  - Level 2 = 9.0 milestones/year
  - Level 3 = 33.0 milestones/year
  - Level 4 = 51.5 milestones/year
- Increase the number of milestones at lowest control levels so that engineer (or worse physicist) estimates are not used to monitor progress
- Lower level managers should use multiple aggressive milestones in updates
- Remember: contingency, not costs are centrally controlled

## Risks, Trades, and Unresolved Aspects

- Rapidly moving to CD-3b
- Project *souciometer*  
(project schedule anxiety)
  - Items/subsystems in fabrication/construction = !
  - Items/subsystems in detailed design = !!
  - Items/subsystems in preliminary design = !!!
  - Items/subsystems in conceptual design = !!!!

## FAC Meetings

*There is no monument dedicated to the memory of a committee. -- Lester J. Pourciau*

### ■ We're not a review committee

- You don't have to "sell" us on how good you are
- We're here because you asked us to come
- Need to fully exploit us (something you don't hear often)
- Just a very few summary viewgraphs on accomplishments
- Focus on issues that cause concern, are lagging, or in design



## Future meetings

- 1 ½ day is short and so must the FAC must focus
- Spend time on those items where FAC can actually have influence
- Use FAC to highlight and concentrate on issues
- Provide FAC information on all reviews, technical and otherwise, prior to the FAC meeting
- Provide FAC members access to project website to maximize ability gain understanding before meeting
- Send responses to previous meeting far enough in advance of meeting to allow review by FAC members

## A Note on Presentations

- Unless you do have a medal from the King of Sweden honoring the inventor of dynamite:
  - You must not exceed **0.5 rubbia** (1 slide/minute)
  - If you want any discussion (that's why we're here) **0.25 rubbia** maximum (0.5 slide/minute)
- Use LCLS Managers as “time cops” in sessions

# Accelerator systems

- MANAGEMENT

- The committee once again recognizes the excellent accelerator team supporting LCLS
- The appointment of a Laser Group leader, and hire of an additional engineer, are welcome developments. Continued growth of the group is essential.
- Access to engineering resources may be problematic
- The Laser Group focus at this time is on the photocathode system, the Committee thinks that the Group should formally report to the electron beam systems manager
- Accelerator R&D in support of LCLS in the era of BES operations of SLAC needs to be fostered

# Accelerator systems

- PHOTOINJECTOR
- Laser
  - Bill White adds to the strength of the Laser Group in broad experience with laser systems operations
  - Additional hands-on PhD level experimentalist staff is needed
  - Integration of laser systems with the accelerator systems is critical
    - One team - laser and accelerator physicists work together
  - Good to see construction of the S20 laser room beginning
  - Some concerns on ability to meet pointing stability requirements and uniformity on cathode
  - Integration of beam shaping system with Thales delivered systems should be closely coordinated with Thales
  - A consultancy agreement with Thales should be explored
  - A second laser system is highly recommended, in conjunction with a new gun test facility

# Accelerator systems

- PHOTOINJECTOR
  - RF gun
    - In-house fabrication to begin soon - this should retain a high priority in obtaining necessary resources
  - A new gun test facility is important for development of this critical technology
    - Full system - including laser, cathode cleaning, beam diagnostics, ...

# Accelerator systems

- GTF
  - GTF resources in FY06 may be better directed toward the LCLS injector test and commissioning phase
  - A new location for a gun test facility should be found

# Accelerator systems

- LINAC
  - CSR measurement and bunch length feedback systems are essential to successful operation of the facility
  - The level of conceptualization, planning and execution of this critical diagnostic are inadequate for this stage of the LCLS Project
    - A remediation plan should be initiated immediately and include experience from other facilities
  - Additional mechanical engineering resources are needed in several areas to meet the installation schedule
  - An additional LLRF systems review should be held within ~month

# Accelerator systems

- FEL PHYSICS
  - Good studies of trajectory tolerances
  - Good studies of tolerances to understand FEL output sensitivity
    - Temperature stability in the undulator hall now  $\pm 0.5^\circ\text{C}$



# Accelerator systems

- **UNDULATOR**

- Good progress with undulator systems
- Vacuum chamber fabrication is critical: concerns
  - Weld permeability
  - Al coating adhesion during forming
  - Surface roughness
- Details of quadrupole support need to be developed
- The committee would like to see proposals for fast beam loss monitoring systems for undulator protection

- **ALIGNMENT**

- The various alignment proposals (BBA, stretched wire, scanning wire, HLS, photon-beam based) need to be re-examined in the context of an overall alignment strategy
  - The committee would like to see a scheme for using these redundant systems

# **FAC Conventional Facilities Subcommittee Report**

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**H. Carter, A. Chargin, G. Kugler, K. Schuh**

# Conventional Facilities Subcommittee Report: Charge for this Review

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- Consider responses to last (the April 2005 FAC) Review
- Consider the planned/proposed scope changes to accommodate the conventional facilities costs

# Conventional Facilities Subcommittee Report: Responses to Last Review

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- The subcommittee was pleased to see that our recommendations from the April 2005 FAC Report have been satisfactorily addressed.

- Areas of Priority were:

- Undulator tunnel design for stability and long term creep
- Undulator tunnel temperature stability
- LCLS Construction Safety Program: Program established
- Construction Management: award of contract for CM/GC as soon as possible (resolved)
- Jacobs Design Management turnover issue (under control but still an LCLS management concern)

**Workable CF solutions were not apparent**

# Conventional Facilities Subcommittee Report: Responses to last review (cont.)

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- April 2005 General Comments topics were:
  - Conventional Facilities Project Start
  - Interaction with DOE/EPA
    - w/re UBC1997 as relevant code (resolved) and
    - Existing FONSI [Finding of no significant impact] determination (resolution in progress)
  - Contingency and Schedule: contingency appeared adequate and schedule aggressive but doable
  - HVAC and Vibration
  - Far Hall Layout: finalize design (accomplished)

# Conventional Facilities Subcommittee Report: Planned/proposed scope changes to accomodate the conventional facilities costs

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## CF Descoping Plan:

- Conventional Facilities Spreadsheet developed addressing ~60 items in the following areas
  - Tunneling
  - Architectural, Structural, General
  - Mechanical
  - Electrical
- All cost savings are based on Title II numbers
- Total savings by adopting (LCLS/SLAC mgmt.) approved items ~\$11M

# Conventional Facilities Subcommittee Report: Findings

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- Require Turner to resolve contract issues before each contract closeout
- Incentives based on BOD need to be explicitly defined
- The LCLS ES&H Plan has a few problems that need to be resolved
- Contingency and schedule: Title I cost estimates for CF now appear to be low based upon later estimates and actual bids.
- Descoping is planned to accommodate escalating CF costs. The proposed descoping plan is commendable and appropriate in order to increase contingency

# Conventional Facilities Subcommittee Report: Recommendations

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- Require Turner to resolve contract issues before each contract closeout
- Incentives based on BOD need to be explicitly defined
- Complete FONSI review for continued validity with CF design changes. Revise and resubmit for approval if necessary.
- Rewrite ES&H Plan. Do a flow through test of the document when finished
- Review cost data



# Controls

Tom Himel

Karen White

# Controls

- Excellent progress
  - Many issues addressed
  - Strong technical team
  - Good use of standards
  - SLC aware IOC functional

# Issues

- Database – late start may impact reach
- SLC Integration – need to set SLC devices from EPICS side
- PPS – need approval for PLC technology
- MPS – late start\* BPMs – tight schedule
- Management – going well – need to plan for transition to new leader
- Process – ensure reviews are documented

\*Bob & Tom have a nickel riding on this one



# Future

- Would like to see network layout and cyber security plans for next time

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**X-Ray Subgroup Summary**  
**Facilities Advisory Committee**  
**October 28, 2005**

Josef Feldhaus

Paul Fuoss

Tom Rabedeau

*Roger Falcone*

*Thomas Tschentscher*

*Pete Siddons (resigned)*

# Discussions

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- LCLS/LUSI Experiments - John Arthur
  - Much progress in communicating with experimental groups
  - Hutch layouts and assignments have been finalized
  - Shorten tunnel to save 0.5M
  - No flipper mirrors
- XTOD Layout and Diagnostic Systems - Donn McMahon
  - The team is fully staffed
  - Modeled beam transport system
  - Presented conceptual slit design
  - Presented new FEE layout with expanded space
  - Solid attenuator
- Gas Attenuator - Stewart Shen
- X-Ray GB Separation Periscope - Michael Pivovarovoff
  - Preserving beam brightness and full coherence isn't possible with current technology
  - Deformation of mirrors in gravity needs to be studied
  - Science driven requirements need to be developed
- X-Ray Diagnostics - Rich Bionta
  - Preliminary data from damage studies from VUV-FEL
  - Cryogenic bolometer probably won't survive FEL beam
- X-Ray Detectors - Stefan Moeller
  - MOU's have been signed for PIXEL detector and BNL SSD detector
  - MOU almost done for streak camera
- Experimental Area Conventional Facilities - Stefan Moeller
  - Detailed layouts of both halls seem good
  - X-ray experimental systems is gaining staff

# Concerns from April

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- Per shot beam characterization.
  - Each pulse needs to be characterized nondestructively if single shot experiments are being performed.
  - May cause large computational and/or network demands
- Diagnostics to detect low-gain FEL beam
- Mirror optics
  - Coherence preservation
  - Angular stability
  - Degradation from high energy photons and particles
  - Degradation from high peak fluxes
  - Overall layout
- Layout of optics and experiments in FEE and NEH
  - Is space being used efficiently (FEE)?
  - Experiment in NEHH#1 pressures FEE
  - Poor coordination between affected parties (recent hire may improve this)
- Design of FEH hutch layout
  - Straight through beam capability
- Concepts rapidly changing

# New Concerns

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- Descoping process
  - Movement of the FEH upstream.
  - Removal of flipper mirror
  - Willingness to make irreversible decisions in the process
  - Not clear that all of the dependencies are being considered
- Improve the link between physics requirements to engineering design
- Coordination of design information flow from scientists to designers
  - Basically all information goes through John Arthur who is overcommitted



# Prior Recommendations

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- Efforts of the x-ray group should focus on problems which are unique to LCLS
- Hutch layout
  - All hutch and assembly areas should have same height
  - Favor “Stephenson” staggered hutch arrangement
  - Ensure that on-axis hutch has provision for “white” beam
- Optics (mirror) design
  - Preserve option for straight through beam operation
  - Deal with personnel protection issues now, don’t assume they will become easier later (PLC for PPS maybe a problem)
  - Investigate long-term damage to mirror and impact on coherence preservation
  - Include stability and alignment issues in design
  - Generate holistic design that preserves future flexibility
- DESIGN a revised beam transport, optics and hutch layout
  - publicize it
  - get buy-in from experimental groups
  - make decision

# New Recommendations

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- Don't move FEH to save 500K
  - There may be design considerations that lead to it moving
- Include flipper mirrors
  - There is no need to build all three hutches in FEH if flipper mirrors are not included in the plan
- Improve reliability and efficiency link between the science driven requirements and the engineering product.
- Engineer for cost effectiveness.
- **Focus NOW on mirror system performance requirements and how to achieve them!**