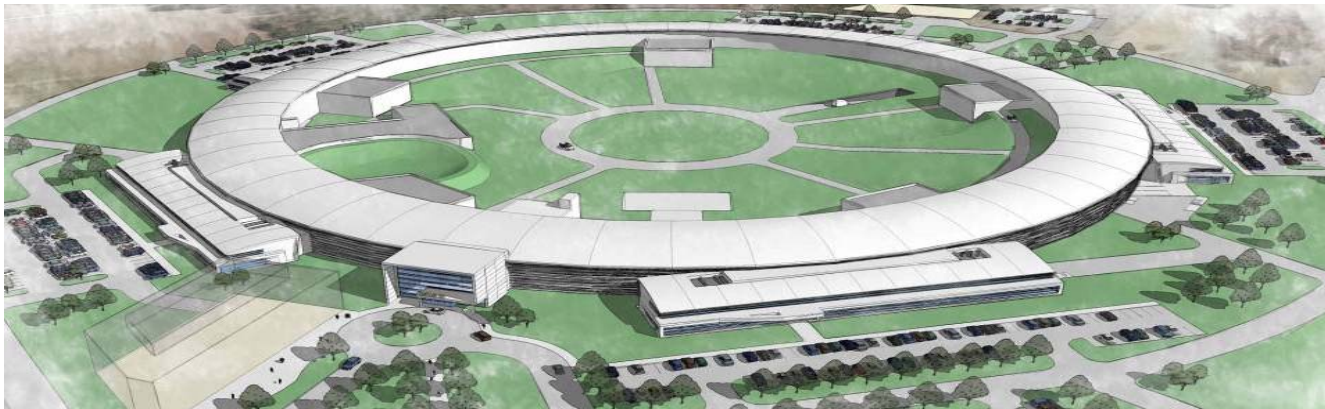

Charge and Response to the Committee



3rd Accelerator Scientific Advisor Committee Meeting
Brookhaven National Laboratory
October 8-9, 2007

F. Willeke,
NSLS-II Accelerator Systems Division

Charge

- assess the feasibility of the optimized NSLS-II accelerator lattice taking into account aspects of beam dynamics as well as operational and maintainability aspects
- to assess the work in progress on the impact of insertion devices on beam stability and lifetime
- examine NSLS-II plans for orbit corrections and orbit stabilization
- Assess impedance and beam heating issues
- examine design, the testing, prototyping and procurement plan of the storage ring magnet system
- examine the plans for vacuum and front end systems giving special regards to the design of the damping wiggler absorber systems
- review the injector complex
- review plans for electrical infrastructure
- review the plans for the control system
- comment on cost estimate, schedule, staffing, and procurement plans
- comment on alternative choices

In addition, any comments and additions, the committee wishes to make in regards of the reviewed systems are welcome.

The committee is expected to express its findings, comments and recommendations in a written report which should be submitted to the NSLS-II project director, Steve Dierker on or before October 31, 2007.

Response to the committee

- Formalized the response to committees comments and recommendations to make optimize use of the committee work
- The results of some of the committee's suggestions will be part of the some of the committee suggestions will be part of the technical presentations
- The following will be a quick summary of the responses

Review Tracking Report

Review #:2007-001

Program: Accelerator Systems Advisory Committee (ASAC)

Date Performed: 4/23/2007

Date Closed:

Comments: Next meeting scheduled for October 8 and 9, 2007.

<i>Finding #:</i>	<i>F01</i>	<i>Priority:</i>	<i>Status:</i>	<i>Open</i>	<i>Scheduled Close:</i>	<i>10/8/2007</i>	<i>Actual Close:</i>
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Description: The committee wishes to be presented, at the next meeting, an overall schedule of the project, highlighting the links or conflicts between the building program, the accelerator program and the beamline program.

Owner: Steve Dierker

Action: Provide summary schedule, highlighting the links or conflicts between the building program, the accelerator program and the beamline program.

Response: A summary schedule will be provided at the next meeting.

Response to the Committee

3rd floor to bring staff close to facility: looked at, very expensive

Canting of wigglers: driven by requirements from experiments (see report)

NSLS2 involvement in injector design: preliminary design performed by NSLS- II

Accelerator cost low: : burdened cost from 183M\$ to 250M\$, more appr.

Extra Long Straights: committees proposal to have several long straights would have a large cost impact or would reduce # beam lines, major lattice design change incompatible with our aggressive schedule. We go along with our plans to keep investigating the feasibility to introduced up to 3 extra- long straights into the existing footprint.

Centre Quad, sextupoles per cell: CQ has been eliminated, # sextupoles reduced, straights become 5.6 → 6.6m and 8.6 → 9.3m

Dipole Correctors in Sextupoles: looked at, more costly, field quality issues, still a value engineering option

Consumerability of harmonic numbers: $h_{sr}/h_b=5$ is chosen

Modeling ID for tracking: Several methods are applied and compared → Bengtsson's talk

Response to the Committee, contin'd

DW design and impact on beam: design study performed in industry (Tanabe), impact on beam being studied (Bengtsson)

Injection Studies: being continued

Injection straight length: there is a design which includes reasonable technical margins (Shaftan)

Design for 3.6GeV: Was planned for in the designs for components difficult to upgrade(injector, magnets, PS, process water), option has been abandoned to save costs

Booster lattice flexibility: has been demonstrated (Shaftan)

Engineering Layout of Booster: not yet available, but circumference enlarge to 158m (Shaftan)

Hybrid Filling Modes: Are considered, are not in baseline, R&D program delayed for cost reasons

Response to the Committee, contin'd

Individual Pulser for inj.kickers: planned (Shaftan)

2 types of Dipoles: there are trims in the dipoles to correct differences

20 bit corr, 18 bit mp: planned are 18 bits

XBPM: workshop planned (Singh)

Decker distortions: integrated in the lattice design, implemented for base-lined beam lines
(Kramer)

Wire alignment issues: R&D in progress, sag as predicted demonstrated, precision demonstrated (Skaritka)

Girder Fixation: Successfully demonstrated (Skaritka)

TE modes in BM: taper-bpm positions optimized (Hseuh)

FIR mirror issues: mirror position optimized, slotted design, indirectly cooled (Blednykh)

Manual Valve beginning FE: considered but not adopted (Hseuh)

Magnet-Magnet interactions: addressed in R&D program (Skaritka)

CPMU: make only sense with new materials, combined CMU new materials R&D planned outside project scope, Baseline: CPMU → IVU (Tanabe)

Rad Dose on Tunnel roof: below conservative limits before, , trade-off cost vs. accessibility being made

Recent Formal Technical Reviews

Storage Ring Magnets, Vacuum Systems, and Front Ends Technical Review	August 6-7
Accelerator Instrumentation and Diagnostics Technical Review	August 9-10
Insertion Device Technical Review	August 20-21
Power Supplies Technical Review	August 27-28
Cost and Schedule Review	August 30
Control Systems Technical Review	August 30-31
Accelerator Physics Technical Review	September 5-7
Comprehensive Design Review	September 11-13
Accelerator Interlock System Technical Review	September 20

<http://www.bnl.gov/nsls2/project/pass.asp> (username & password required)

Technical Reviews: Major Recommendations

Magnet, Vacuum, Frontend Review (August 6-8)

J. Tanabe, SLAC; E. Trakhtenberg ANL; J. Jagger (FNAL)

- Sort laminations
- Consider straight dipole (not done but technical solution for curved dipoles)
- Consider higher current density than 5A/mm^2 (overall optimistic incl ps done, vibrations from coolant taken into account) (Skaritka)
- Make wide sextupole design symmetric (ok)
- Magnet Procurement: build to print recommended (Skaritka)
- Frontend: One Photon shutter and one safety shutter solution endorsed (Hseuh)
- Vacuum: use of codes to calculate radiation may save shielding (still considered)

Technical Reviews: Major Recommendations

Instrumentation (August 8-9) R.Hettel, SLAC; M.Ross, FNAL; G.Rehm, Diamond; B.X.Yang, ANL

- Develop more systematic specifications for diagnostics
- Model emittance tuning with realistic performance of BPMs
- Initial BPM efforts to be limited to 2mm
- Increase corrector resolution to at least 18 bit
- Consider to integrate BPM into MPS
- Consider BPMs in LINAC, should work with low charge
- Consider non-intercepting Sychrotron Light monitor in BTS transfer line
- Number of BPMs ok, but consider to add a few BPM
- Consider alternate vendor for BPM electronics
- Consider smaller buttons (heat load)
- Minimize insertable screens
- Use more (>30) loss monitors
- Reconsider the use of in-flange DCCT
- Consider zone plate instead of interferometer for emittance measurements
- Integrate slow and fast orbit feedback into one system
- organize workshop on xbpn

Technical Reviews: Major Recommendations

INSERTION DEVICES August 20-21 J. Chavanne, ESRF; J. Bahrtdt, BESSY; S. Shigemi, APS

- Need magnet measurement facility
- Strengthen mechanical design capability for future ID
- Own the vendor supplied designs
- Integrate ID controls
- Simplify DW design in-house, need not to be moveable gap but easily removable
- Reconsider CPMU as baseline ID, CPMU large R&D project

Power Supplies August 27-28 H.J. Eckoldt, DESY; F. Jenni, PSI; J. Sandberg, BNL; Ju Wang, ANL

- Formalize specification, more FTE for PS, dedicate QA engineer

Many value engineering proposals:

- Dipole PS, consider: 12p→24p, Δ WYE transf. config., validate active filter design, simpl.outp. filter
- Correctors: 20 bit overkill
- High stability - large BW dyn. correction: contradicting requirements→separate AC, DC correctors?
- Reconsider use of linear PS
- Chilled water input for rack air cooling too cold (45F)
- ...consider UPS, common DC supply for chopper, separate electronic and hi power in racks ...

Technical Reviews: Major Recommendations

Controls, August 30-31 P. Duval, DESY; J.Carwardine ANL; T. Korhonen PSI,

- Develop RDB
- Enforce unique naming system
- Internal Review of each cntl WBS
- Reexamine control cost estimate
- Involve controls early in techn. subsystem design
- Reassess need and capacity of shared memory network for synchronous control functions
- develop integrated system view of MPS
- Reassess orbit feedback concepts

Technical Reviews: Major Recommendations

Accelerator Physics Sept.5-7 C. Bochetta, Instr. Techn.;M.Boege, PSI; M.Eriksson, MAX-Lab; L Emery ANL; T. Roser, BNL; A. Streun PSI

- Individual quadrupole strengths strongly recommended
- Include decker distortion, canting and extra-long straights in baseline whenever possible
- Stabilized User BPM endorsed
- Skew quadrupoles endorsed
- Consider increasing injection rate to 3Hz
- Study bunch pattern influence on LINAC and Booster BPM
- Pay more attention to ion effects
- Heat load on CPMU beam pipe from beam to be assessed
- 3D modeling of lifetime limiting Touschek scattered particle encouraged
- Consider NEG coating of beam pipes
- Consider separate slow and fast orbit correctors
- Need ID lab
- Consider variable DW gap
- Evaluate effort for reconfiguring ID straights when new beam lines are installed

Comprehensive Design Review Major Recommendations

JM.Filhol, Soleil; M. DeJong, CLS; T Furuya, KEK; G. Hoffstaetter, Cornell; D. Rice Cornell; K. Sinram, DESY; U. Wienand, SLAC; M. Zisman, LBL

- Collaborate with Industry for higher BPM resolution
- Evaluate need for beam abort
- Develop fall back for Top-u with degraded performance
- Assess spare cavities
- More emphasis on Landau cavity design
- SR from dipoles into SCC taper to be assessed
- Assess cool down time for cryo system incl. indep. cooldown of RF cavities
- Study effect of transport on magnet alignment on girder, study thermal effects
- Magnet design: build prototypes, 10A/mm² not recommended
- Consider switched mode ps for main dipole circuit
- Schedule design reviews for infrastructure
- Consider TiN coating of beam channel (ecloud issue for e-)
- Iterate bellow design consider dust and HOM power effects
- BPM mechanical precision after bakeout to be checked
- Prioritize day one diagnostics, check bpm hom heating
- Control FTE too low, prioritize day 1 controls
- Variable gap DW, implement ID lab
- Don't use dipole for beam abortion

Summary

- NSLS-II Accelerator Design Effort was thoroughly review by very detailed technical review process in the summer of 07
- Overall committee response is very supportive
- Many recommendations endorse NSLS-II design choices or ongoing/planned efforts
- Some overlap: Most of the recommendations agree
- Few exceptions: variable wiggler gap, fast-slow orbit corrections
- Many proposals for value engineering efforts