NSLS-II 27-ID HEX Beamline PDR

Meeting Date: April 26, 2018

Purpose

The purpose of this review is to assess the technical, cost, schedule, management, and ES&H aspects of the HEX Beamline. The Preliminary Design Report is expected to provide sufficient technical depth and detail to demonstrate that the required performance expectations are likely to be met and the design is feasible and sensible. The review will also assess the planned schedule and budget, and identify any major outstanding risks that must be addressed.

Panel Charge Questions and Responses

The specific elements of the charge are as follows:

1. Preliminary Design:
    a. Are the preliminary designs technically sound and likely to meet the identified performance requirements for carrying out the scientific mission of the beamline?
    Yes- based on the presented material the preliminary designs meet the performance requirements of the beamline.
    b. Given the current state of progress, and design maturity, is it reasonable to proceed with long lead time procurements as planned?
    Yes- once recommendations on long lead items have been addressed.
    c. Is the supporting documentation adequate for this stage of the project?
    Yes.
    d. Have recommendations from previous reviews been incorporated?
    Some recommendations from the CDR have been incorporated and all are being tracked. However, the decision for the SCW needs to be finalized as quickly as possible.
2. Project Scope: Is the project's remaining scope sufficiently well-defined to support the cost and schedule estimates and allow the beamline to be completed to plan?
    Yes – the cost and schedule that has been developed is sufficiently complete and detailed to support the cost and schedule estimate. However, the cost estimate is over budget. Therefore, the scope contingency plan needs to be fully developed to meet the current budget and refined throughout the project.

3. Cost and Schedule: Does the project have good cost and schedule estimates? Is it clear what remaining activities are to be provided and paid for by the Partner group and by NSLS-II? Do these estimates include adequate contingency (cost or scope)?
   Yes – management is being paid for by NSLS-II and NYSERDA is paying for the capital cost. The cost estimates provided do not yet include adequate scope contingency.

4. Risks: Are the risks (technical, cost, and schedule) understood and are appropriate steps being taken to manage and mitigate these risks?
   Yes- a detailed risk assessment has been performed. The mitigation plan needs to be developed. The largest remaining risk continues to be the SCW.
5. Management: Is there a credible plan to manage the project? Is the project team organized and staffed adequately to carry out the project? Are the roles of the Partner and NSLS-II staff sufficiently well defined?
   Yes.
6. Are ES&H aspects being properly addressed given the project's current stage of development?
   Yes, the review team demonstrated understanding of ES&H principles and challenges for this project.

Meeting Notes:

Background/Overview (Broadbent)

The High Energy X-Ray (HEX) beamline project is funded by NYSERDA ($25M) and NSLS-II ($5M). NSLS-II funding will be completely separated from NYSERDA funding, and pays for management and oversight. This project duration is 5 years based on the funding specified in the NYSERDA contract, with the goal to finish earlier than the contractual milestones. The current scope of the project, decided by NSLS-II and BNL management, is to build-out the center branch and satellite building with current funding. The full build-out of three branches of HEX is estimated to be $40m (additional funding will be sought for the remaining 2 branches).

The project management team consists of experienced Cost Account Managers (CAMs) and a Work Breakdown Structure (WBS) similar to previous NSLS-II beamline projects.

A question was raised regarding the staffing profile of the project and availability of a second beamline scientist and technician. Andy: technician requirements will be performed by DISC program tech on hand. Hiring of second scientist has been approved and the job posting will be advertised soon.

Cost and Schedule

The current project cost estimates are projected to be over budget. There is $600k of contingency currently being held in satellite building budget and some uncertainty with the pricing of the hutches. Once hutch and satellite building contracts are awarded, budgets will be much better understood and scope can be adjusted as needed. If the costs for these overrun, the plan is to de-scope hutches that are not used by the center branch in order to remain under budget.

Scope contingency includes removal of side-branch hutches ($265k) and de-scoping of new endstation equipment (1.3M):

- Recommendation: Keep hutch D in scope. Removing hutch D would prohibit access to hutch E roof via the current bridge and additional stairs would be needed.
- Recommendation: Identify existing equipment that would be needed for endstation de-scoping and properly reserve it for use by HEX.

Recommendation: Bring the award for satellite building construction forward to occur before the hutches as funding allows, to better understand contingency situation.

PDR document lists components as initial scope, mature scope and out of scope. Recommendation: Come up with a prioritized list of scope additions/deletions.

Recommendations from previous reviews are being tracked using a SP site tracker. Of 37 recommendations from reviews 25 are closed and 12 are ongoing.

Long lead time procurements identified in the charge are the hutches and satellite building

On the funding, costs and obligations chart there are three main jumps in cost, first in Dec is hutches, then satellite building then SCW and BL components. The second two of these jumps result in the obligation costs exceeding the funding profile, and mitigation factors were discussed, including careful timing of procurements, requesting variations in NYSERDA funding profile and short term coverage from

BNL. It was also noted that building SCW in house could help keep obligated funds within the funding on-hand.

Cost estimates to be further refined for SCW, the front end, satellite building, beamline components.

NYSERDA contract is milestone based. Milestones listed in contract need to be achieved on schedule. It was noted that the PDR milestone is the tightest by far.

The review team notes that the latest citation date in the PDR is in 2011. Recommendation: Consider having the BAT update the scientific case presented in the PDR report and consider the emerging questions in the field that the HEX user community will represent.

Scientific Endstation Design (Zhong)

Three endstation techniques are being pursued: EDXD (energy dispersive x-ray diffraction), imaging (phase contrast), and ADXD (angle dispersive x-ray diffraction).

Endstation F in satellite building will consist of (upstream to downstream):

1. Micro focusing optics/slits/filters and ion chamber,
2. Sample stage,
3. Imaging, EDXD, and ADXD detectors, available for selection one at a time
4. Space for large equipment
5. Very far-field imaging/SAXS detector (out of initial scope)

The review team notes that the beam defining slit at entrance of hutch F which will introduce large source of scatter. Recommendation: Include a lead shield after the slits in hutch F to prevent background radiation for the detectors.

W.K. Lee: At lower x-ray energies, the ion chambers do not saturate at fluxes in the 1e13 range. Recommendation: Investigate ion chamber performance working at energy ranges of 30 keV and up.

Endstation design for the three techniques allows instruments and detectors to be moved out of the beam while other techniques are being used. Recommendation: Consider possibility of having imaging and diffraction experiments being performed concurrently.

The review team notes that stability may be an issue having the sample stage separate from the detector support. Recommendation: Build a stand that shares the sample stage and detectors. Have precision engineering and nano-positioning group review.

Scintillator used for imaging needs 1 micron resolution at 100keV. Consider:

A) Designing a modular camera system where scintillators units (consisting of scintillator, light shield and optical mount) can easily be exchanged for various reasons: scintillator materials differ in light yield and decay time. Novel materials will emerge. Scintillators may need to be cleaned regularly.
B) 1 micron optical resolution at high energies is achievable, however Compton and fluorescence inside the scintillator blur the point spread function; this needs to be considered and may need careful commissioning studies.

Recommendation: The ability to change scintillators should be included in the design.

Sample environment will be capable of holding 50kg samples with a max sample size of a 20cm sphere. The review team notes that the sample stage is well specified and provisions for utilities are well defined.

W.K. Lee: For imaging, motorized x and z rotation stages are not needed and can be manual, unless needed for diffraction. The current sample stack is very high and for stability reasons should be made as short as possible. Consider whether z-stage or any others can be removed.

The multi detector array for EDXD is currently not in scope and considered an option. Pete noted similar detector is in use at APS. Recommendation: The review team notes that the multi array detector is in the project cost plan and recommends that multi array detector should be in initial scope. Talk to detector group for costing and general information.

Recommendation: Consider provisions for in-operando sample environment capabilities. The review team notes that this is not in scope but provisions and space requirement should be considered.

Satellite Building Design (McCaffrey)

Design of satellite building is very similar to HXN satellite building with the following exceptions:

- Dimensions of the concrete hutch (increased wall thickness)
- Number hutch labyrinths (decreased)
- Temperature control requirements (decreased)
- Vibration requirements (decreased)
- Air distribution system (simplified)

Plan to have 100% design finished by June 2018.

Actual construction considerations of HEX need to account for removing existing exterior walls at LOB2 and on the experimental hall and include temporary partitioning.

Risks for construction cost and schedule include, material escalation due to tariffs and limited competition on island. Possible sources of mitigation of risks would be using contingency money, accelerating the construction schedule and possibly packaging this project with another on-going project on site (currently under discussion).

The doors and labyrinths in the satellite building will be included in the hutch contract.

No crane included in scope of building. Possibly thinking of adding a single beam in the hutch. Recommendation: Add 1T manual slide/electrical hoist crane to endstation scope.

A question was raised regarding the movement of foundation in relation to experimental floor. Currently a 1m thick foundation that is on top of sand. Based on results from HXN, this should not be a problem.

Front End (Sharma)

Standard front end at NSLS-II is not able to be used for HEX based on SCW source specifications and 3 different beams. These differences include:

1. Modifications to existing dipole chamber needed and a new exit flange absorber needed based on preliminary ray-trace

2. The fixed aperture mask will be made of CuCrZr rather than Glidcop. Material allows for welding to flanges, fittings etc.
3. No vertical walls between apertures. Thermal FEA performed and calculation results are within acceptable limits.
4. Slit design changed from CDR. Initially each beam had its own vacuum space now center beam and inboard beam share space. Allows cooling channels in between this vacuum space and outboard beam vacuum space. Slit design allows for selection of slit while beam is on.

Lead collimator and safety shutter design is standard NSLS-II design.

Schedule shows ~2 year gap between final design review and procurement of components due to funding profile.

Installation of FE: Assembly is done in an outside lab then brought in and installed. This will be able to be done in one shutdown based on previous installations. Cabling will be done in a prior shutdown.

Superconducting Wiggler (Tanabe)

Two plans being pursued:

Plan A: Turnkey solution procured from contractor. Potential contractors have been sent a preliminary specification with some working on estimates. Main risks remain no BNL technical expertise in case of failure, political risk with preferred vendor, and technical risks of some potential vendors without experience.

Plan B: In-house build option using APS design for cryostat and BNL magnet arrays/power supplies. Need to pursue getting design from APS via technology transfer. Risks include cost over-run.

Cost structure and schedule for Plan B need to be better understood. Plan B development of the SCW is NOT in the HEX project schedule.

Recommendation: A decision on Plan B needs to be made as soon as possible to avoid adverse impact on the project. BNL development of SCW should be pursued separately from HEX, if needed.

Recommendation: Regardless of acquisition plan, develop a test plan for characterizing the SCW once it arrives at BNL.

Recommendation: Ensure the cost estimate for SCW includes all associated components including power supplies and utilities interfaces if needed. Investigate if helium recovery system is required.

SCW specs are similar to devices currently in use at other facilities. Nominal minimum gap of SCW is 10mm. Device will be placed in the downstream section of the straight. Horizontal racetrack coil design is being pursued.

Beamline Optics (Zhong)

Current scope includes center branch optics and endstation F. Space for future build-out of canted beamlines has been accounted for in current design.

Monochromator design

The imaging monochromator uses a 25mm crystal offset to provide capabilities to get monochromatic and white beam to the endstation with high stability. The crystals are meridionally bent towards the

source using leaf springs. The energy range of the mono, selectable without adjusting bending of crystals, is 30-150 keV. A cooled Compton shield has been added to protect the 1st and 2nd crystal stage from thermal load. Similar monos worldwide show that this mono design fits in with what is currently being used and is doable. The review team agrees that the mono design parameters are well developed, and has the following notes:

- Mono is 70m away from the sample, if one crystal tails away it will not affect resolution but beam position which would affect tomography experiments but these monochromators are stable
- Recommendation: FEA analysis on monochromator crystals cooling scheme need to be performed for better understanding of impact of temperature on strain and rotation of lattice throughout the optical volume of the crystal. This should be compared to the same volume of the second crystal which remains strain free. Outcomes should guide decision between water and LN2 cooling.
- Recommendation: Addition of ADXD capabilities need to be better developed. Currently, significant overlap exists with capabilities at XPD and PDF in both energy range and resolution. As presented, ADXD does not take advantage of energy range not reachable at PDF/XPD (above 70 keV). Resolution of dE/E of 10-3 with additional divergence induced by focusing might not be sufficient to study the complex engineering and energy storage materials targeted in the scope of HEX.

Micro-focusing optics (F hutch)

The specifications for micro-focusing optics include a spot size of <10 microns, and option for line focusing with distance of 2 m and source distance of 100 m. Potential options include: KB mirror, bent saw tooth, kinoform, CRL.

After consideration, KB mirror system identified as preferred focusing option with bent saw-tooth optics as second option. The review team concurs with addition of micro-focusing options as presented.

- Recommendation: Due to usability with EDXD and ADXD, KB system should be priority. Because of EDXD the KB mirror system should be in vacuum to prevent mirror contamination from exposure to white beam. Budget needs to be updated accordingly.
- The review team notes that the possibility of focusing white beam is favorable. Recommendation: FEA needs to be performed for thermal distortion of the KB mirrors for white beam use.

Possibility to completely remove the micro focusing optics from the beam to be included in design.

Heat load management

Heat load is being managed via a set of diamond filters followed by a set of diamond windows then SiC filters.

FEA performed on the diamond windows and filters show that the heat load is within allowable ranges and lower than XPD.

Diagnostics

Recommendation: Consider adding a beam visualization flag/BPM in E hutch.

Recommendation: Consider adding a beam diagnostics unit in the F hutch to characterize beam stability.

It was noted that a calorimeter on white beam stop after the 2nd mono crystal at XPD and other beamlines has proved to be a valuable diagnostic.

Engineering (Lucas)

An overview of the 3D model was presented by Mike Lucas. The following was noted:

- FOE has 2 rack on roof with 8 roof labyrinths, two sliding doors, a bridge connecting FOE to experimental hall hutches. B hutch will house the future monochromatic outboard branch. C hutch will be future optics hutch. D is the EDXD. E is ADXD.
- Shielded beam pipe thru C and D hutch then unshielded in E. Shielded again from E hutch to satellite building hutch.
- Space between the endstations and outboard wall looks tight in the F hutch. Current model has wall thickness of F hutch as 1 m. Preliminary radiation simulations show this will likely become 0.7m which will increase the space between endstation and wall.
- Current design shows FE safety shutter re-used as FOE shutter. This is viewed as worse case. Options being explored for more compact shutter, but current design will provide enough space for whichever option is required.
- Recommendation: Consider space for future user areas on the experimental floor.
- Swing door on C hutch made of lead. Recommendation: Look into the workability based on the size of this door and consider changing it to a sliding door or two swing doors.

Infrastructure (Stebbins)

Infrastructure layout structure identical to past projects. The main risks is underestimated scope. Some cost savings is expected as a result of lessons learned.

Recommendation: Consider the possibility of needing an eye wash station near/in satellite building.

Recommendation: Ensure the cost for insulation and fence of section of outdoor beam pipe is included.

Endstation Building Shielding (Benmerrouche)

Two sources of radiation considered: gas bremsstrahlung (GB) and synchrotron radiation (SR). Scope of talk will be the hutch F concrete walls of and lead doors.

Lead beam stop based on scatter of target point of the micro-focusing optics. Recommendation: Check to make sure angle used for BR scatter calculations is the largest it would actually be.

Controls (ZY)

Software for fly scanning is done by DAMA group using Bluesky. Recommendation: Make sure that all equipment is EPICS compatible and can be controlled by Bluesky.

Storage of detector data has been thought of and estimated. Amount of storage included in scope would be sufficient for ~1 week. Recommendation: Consider adding more data storage.

Data Handling and Analysis: Data collection and analysis procedures for imaging and ADXD can potentially be copied from existing NSLS II beamlines. Recommendation: Advanced EDXD collection and analysis tools need to be developed; similarly for tomographic reconstruction.

ESH:

- The beamline will have sufficient egress pathway around the F hutch inside the satellite building
- There is exhaust ventilation in scope
- The construction coordination is well thought out with the integration into LOB2
- The design team for the SCW understands the ramifications of the make-or-buy decision on ESH (including ASME pressure vessel codes)
- The egress on the experimental floor conforms to guidelines, with a duck under planned between hutch A and B
- The team has taken advantage of lessons learned in previous projects with design of the satellite building, hutches, and beamline components.

Items for the team to consider:

- Access/egress around the endstation equipment. At worst case with a 1m thick hutch wall, the egress will be about 18", which may be acceptable, but is not ideal.
- The C hutch has a planned swing door made of possibly 1" of lead. This could be heavy to operate, and become a design challenge. Perhaps consider splitting the door, or making it smaller. See recommendation 243.
- Some samples may be very heavy. There is no crane planned. A plan for lifting/positioning these samples needs to be developed. See recommendation 232.
- Some samples may be hazardous. An eye wash and shower need to be included wherever there could be hazardous materials in use (hutch F and sample prep area). See recommendation 244.

USI screening evaluation has been determined as negative based on current design.

Review Committee members:

Steve Sherwood (Chair)
Michael Drakopoulos (DLS)
Lars Ehm (NSLS-II/SBU)
Steven Hulbert (NSLS-II)
Wah-Keat Lee (NSLS-II)
Steve Moss (Authorization Basis Manager)
Pete Siddons (NSLS-II)
Lori Stiegler (ESH)

Attendees

Refer to attached attendance sheet

5/17/2018

X

Stephen Sherwood
Design Review Chair
Signed by: Sherwood, Stephen

Recommendations List

(Numbering based off previous HEX tracked recommendations)

R.220. Keep hutch D in scope. Removing hutch D would prohibit access to hutch E roof via the current bridge and additional stairs would be needed.

R.221. Identify equipment that would be needed for endstation de-scoping and properly reserve it for use by HEX.

R.222. Bring the award for satellite building construction forward to occur before the hutches as funding allows, to better understand contingency situation.

R.223. Come up with a prioritized list of scope additions/deletions.

R.224. Consider having the BAT update the scientific case presented in the PDR report and consider the emerging questions in the field that the HEX user community will represent.

R.225. Include a lead shield after the slits in hutch F to prevent background radiation for the detectors.

R.226. Investigate ion chamber performance working at energy ranges of 30 keV and up.

R.227. Consider possibility of having imaging and diffraction experiments being performed concurrently.

R.228. Build a stand that shares the sample stage and detectors. Have precision engineering and nano-positioning group review.

R.229. The ability to change scintillators should be included in the design.

R.230. The review team notes that the multi array detector is in the project cost plan and recommends that multi array detector should be in initial scope. Talk to detector group for costing and general information.

R.231. Consider provisions for in-operando sample environment capabilities. The review team notes that this is not in scope but provisions and space requirement should be considered.

R.232. Add 1T manual slide/electrical hoist crane to endstation scope.

R.233. A decision on Plan B needs to be made as soon as possible to avoid adverse impact on the project. BNL development of SCW should be pursued separately from HEX, if needed.

R.234. Regardless of acquisition plan, develop a test plan for characterizing the SCW once it arrives at BNL.

R.235. Ensure the cost estimate for SCW includes all associated components including power supplies and utilities interfaces if needed. Investigate if helium recovery system is required.

R.236. FEA analysis on monochromator crystals cooling scheme need to be performed for better understanding of impact of temperature on strain and rotation of lattice throughout the optical volume of the crystal.

R.237. Addition of ADXD capabilities need to be better developed. Currently, significant overlap exists with capabilities at XPD and PDF in both energy range and resolution.

R.238. Due to usability with EDXD and ADXD, KB system should be priority. Because of EDXD the KB mirror system should be in vacuum to prevent mirror contamination from exposure to white beam. Budget needs to be updated accordingly.

R.239. FEA needs to be performed for thermal distortion of the KB mirrors for white beam use.

R.240. Consider adding a beam visualization flag/BPM in E hutch.

R.241. Consider adding a beam diagnostics unit in the F hutch to characterize beam stability.

R.242. Consider space for future user areas on the experimental floor.
R.243. Look into the workability based on the size of this door and consider changing it to a sliding door or two swing doors.
R.244. Consider the possibility of needing an eye wash station near/in satellite building.
R.245. Ensure the cost for insulation and fence of section of outdoor beam pipe is included.
R.246. Check to make sure angle used for BR scatter calculations is the largest it would actually be.
R.247. Make sure that all equipment is EPICS compatible and can be controlled by Bluesky.
R.248. Consider adding more data storage.
R.249. Advanced EDXD collection and analysis tools need to be developed; similarly for tomographic reconstruction.

Sherwood, Stephen

Subject:	HEX Beamline Preliminary Design Review
Location:	Bldg. 745 Rm 156
Start:	Thu 4/26/2018 8:30 AM
End:	Thu 4/26/2018 4:30 PM
Recurrence:	(none)
Meeting Status:	Meeting organizer
Organizer:	Sherwood, Stephen
Required Attendees:	Ehm, Lars; Broadbent, Andrew; Zipper, Joseph; Ganetis, George; Zhong, Zhong; Bai, Jianming; Fries, Gregory; Moss, Steven H; Siddons, David; Hulbert, Steven; Lucas, Michael; Todd, Robert J; Tanabe, Toshiya; Hetzel, Charles; 'daniel.hausermann@synchrotron.org.au'; 'michael.drakopoulos@diamond.ac.uk'; Stiegler, Lori; Yin, Zhijian; Johnson, Erik D; Lee, Wah-Keat; Stebbins, Christopher; Dooryhee, Eric; McCaffrey, Brian; Amundsen, Christopher
Optional Attendees:	Buckley, Michael; Zschack, Paul; Wang, Jun; Caradonna, Peggy; Simos, Nikolaos; Casarole, Laurie; Ghose, Sanjit
Resources:	Bldg. 745 Rm 156

Dear All,

You are invited to participate in a Preliminary Design Review (PDR) for the HEX beamline. The primary objective is to review the preliminary design of the beamline to-date, including the SCW source, the front end, the optical layout, the hutches and satellite building design, and the beamline infrastructure.

Update (4/20/18) The agenda is attached. The link to the review site is:
https://www.bnl.gov/nsls2/project/reviews/180426_HEX_PDR/

The review team will consist of:

Steve Sherwood (chair)
Michael Drakopoulos (DLS)
Lars Ehm (NSLS-II/SBU)
Daniel Hausermann (Australian Synchrotron)
Steven Hulbert (NSLS-II)
Wah-Keat Lee (NSLS-II)
Steve Moss (Authorization Basis Manager)
Pete Siddons (NSLS-II)
Lori Stiegler (ESH)

Thank you,
Steve

HEX PDR Meeting Agenda. 26th April 2018.

Location: B743, R156 *TBC*

CDR chair: Steve Sherwood

Panel members:
Michael Drakopoulos (DLS), Wah-Keat Lee (NSLS-II), Pete Siddons (NSLS-II), Daniel Hausermann (Australian Synchrotron) *TBC*, Lars Ehm (NSLS-II/SBU), Steve Hulbert.

Thursday 26th April

		Duration	Start	Finish
	Executive session.	0:30	8:30 AM	9:00 AM
1	Andy Broadbent: Introduction, project overview and objectives for the PDR. Plans for moving toward the FDR (incl LLTPs). Review of prior recommendations.	0:30	9:00 AM	9:30 AM
2	Eric Dooryhee: Scientific Objectives for base scope and overview of the future scope branches.	0:30	9:30 AM	10:00 AM
3	Zhong Zhong: Base scope End Station Conceptual Design and Fit-out	0:30	10:00 AM	10:30 AM
4	Brian McCaffrey: Satellite Building Design	0:30	10:30 AM	11:00 AM
	Coffee	0:20	11:00 AM	11:20 AM
5	Toshi Tanabe: Source requirements, work from now to make/buy milestone	0:20	11:20 AM	11:40 AM
6	Chris Amundsen: Front End	0:20	11:40 AM	12:00 PM
	Discussion over lunch:	1:00	12:00 PM	1:00 PM
7	Mike Lucas: 3D CAD Walkthrough of the Beamline Design	1:00	1:00 PM	2:00 PM
8	Zhong Zhong: Laue mono	0:30	2:00 PM	2:30 PM
	Optical layout discusison	0:30	2:30 PM	3:00 PM
9	Chris Stebbins: Beamline Infrastructure; utilities, EPS, PPS	0:30	3:00 PM	3:30 PM
10	Zhijian Yin: Controls overview	0:10	3:30 PM	3:40 PM
	Panel questions and discussion. Wrap-up for day, information needed for tomorrow?	0:50	3:40 PM	4:30 PM

Dinner venue TBD

Friday 27th April

	Report writing (draft).	2:00	9:00 AM	11:00 AM
	Closeout session	0:30	11:00 AM	11:30 AM

27-ID HEX Beamline Preliminary Design Review
Attendance Sheet

Date: April 26, 2018

Name	Title	Department/Division or Company
STEVE SHERWOOD	ROS ENGINEER	NSLS-II
Cavs Ehm		NSLS-II / SBU
Michael DRAKOPOULOS		Diamond Light
Steve Hulbert		NSLS-II
Pete Siddons		NSLS-II
Lori Stiegler	EHS	NSLS II - SHSD
ROBERT TODD	ME	VACUUM
Jun Wang	Industry	EPS directorate
Mo Benmerrouche	Radiation Physicist	NSLS II / RCD
Nick Simos	Sr. Scientist	Collider / NSLS II
Toshi Tanabe	Scientist	NSLS - II
Michael Lucas	Beamline Engineer	NSLS - II
Raj Gutta	Sr. PM. Specialist	PPQM
JOE ZIPPOR	QA	NSLS II
Zhong Zhong		
Sushil Sharma	Group Leader ME	NSLS II / ASD
STEVE MOSS	NSLS II ABM	RCD / NSLS II
Zhijian Yin	NSLS II	NSLS II
Brian McCaffrey	Engineer	MPO
PEGGY CARADONNA	Mgr MPO	MPO
Laurie Casardle	MPO	MPO
Chris Stebbins	Project Engineer	NSLS - II
Greg Fris	Project Engineer	NSLS - II