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# Review Tracking Report

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Review #:2007-003

*Program: Experimental Facilities Advisory Committee (EFAC)*

*Date Performed: 5/10/2007*

*Date Closed:*

*Comments: Next meeting scheduled for October 4 and 5, 2007.*

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<i>Finding #:</i>	<i>F01</i>	<i>Priority:</i>	<i>Status:</i>	<i>Open</i>	<i>Scheduled Close:</i>	<i>10/4/2007</i>	<i>Actual Close:</i>
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**Description:** Moving the NSLS II as close as possible to the NSLS still leaves a substantial walking distance between the two buildings. The EFAC recommends that a covered walkway be provided between the two buildings to ameliorate the journey back and forth during inclement weather conditions.

**Owner:** Marty Fallier

**Action:** Consider construction of a covered walkway between the NSLS and NSLS-II buildings.

**Response:** The covered walkway is not in the base scope for the project due to overall cost pressure to retain only those items essential to the mission. It is recognized that a covered walkway would be a substantial enhancement and will be considered as an additive item later in the project if cost performance and contingency use allows. The covered walkway can be added at any time.

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<i>Finding #:</i>	<i>F02</i>	<i>Priority:</i>	<i>Status:</i>	<i>Closed</i>	<i>Scheduled Close:</i>	<i>10/4/2007</i>	<i>Actual Close:</i>	<i>10/3/2007</i>
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**Description:** In order to facilitate and maintain accessibility and communication between the NSLS II user community and the NSLS II management, the EFAC strongly recommends that the possibility be explored of providing office space for the NSLS II Director and NSLS II Scientific Director within the NSLS II building itself.

**Owner:** Marty Fallier

**Action:** Consider options to provide office space for NSLS-II management.

**Response:** The preliminary design drawings contain an optional 3rd floor on the Operations Center, with office space, that could be utilized by NSLS-II management.

## Review Tracking Report (Cont.)

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**Finding #:** F03    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** The NSLS II has increased the size of the five LOBs around the facility. The current design provides for 72 offices and 6 laboratories serving a total of 6 sectors. For programs in material science-style programs, the EFAC feels that the overall LOB space planned is about right, however we feel that it would be wise to add one or two more labs per LOB at the cost of some office space. By contrast, for a state-of-the-art, highthroughput, biology program, the EFAC considers it highly likely that additional total space will be required, including more lab space and cold rooms, providing different temperatures. For reasons of expandability, in response to the biologists needs, the EFAC prefers the LOB design that configures the LOBs as a straight building, rather than wrapped around. Based on our experience at APS, the EFAC wonders whether the area currently-planned for LOB parking lots is sufficient, and we recommend that the area allocated to parking-lots be carefully reconsidered. Currently, access to the NSLS II experimental floor from the outside for truck deliveries is through an intermediate staging room. However, the access from the staging room to the main facility is through a normal access corridor. The EFAC recommends rearrangement of the access doors to the floor in the intermediate staging room to be in line with the outside door so that large equipment and, for example, large hutch components can be loaded and offloaded easily to and from the NSLS II floor.

**Owner:** Marty Fallier

**Action:** Consider space allocations in the LOBs, the LOB design shape, and the number of planned parking spaces. Also, consider rearranging the access doors to the experimental floor in the intermediate staging room, to be in line with the outside door.

**Response:** The current LOB design uses the straight layout which enables more flexibility and expandability. The floor plan of the LOB's is designed to allow varying proportions of Office to Lab space. As beamline needs are further refined, the floor plans can be adjusted accordingly. LOB 4 is currently designed as a shell to enable flexibility in defining its ultimate floor plan. Also, the parking lots have been increased to accommodate 100 vehicles. Finally, the LOB offloading area includes two large double doors to allow direct access for bulky items to be moved to the experimental floor.

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**Finding #:** F04    **Priority:**    **Status:** Open    **Scheduled Close:** 10/4/2007    **Actual Close:**

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**Description:** With regard to extra-long straight sections, the EFAC notes that key NSLS II experiments are either brightness- or flux-limited. For such experiments (which include nanoprobe, imaging, XPCS and IXS) the factor of 2 or 3 increase promised by a longer undulator are very appealing. Therefore, we urge continued examination of the feasibility of extra-long undulators, while endorsing the decision to consider the standard DBA30 as the CD 2 baseline.

**Owner:** Ferdinand Willeke

**Action:** Consider continued examination of the feasibility of extra-long undulators.

**Response:** Extra Long straights up to 18m are being considered to be integrated in the accelerator lattice by lengthening a particular straight section on expense of shortening the two neighbored ones. Potential locations of such extra long straight which require a small modification of the inside tunnel wall are identified. The feasibility in terms of beam stability (impact of the reduction of symmetry), a definite layout or scheme is planned but is not pursued with highest priority for the time being due to more urgent design work to be completed for CD2. This strategy has been coordinated with NSLS-II management.

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**Finding #:** F05    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** Purposed to two beamlines, canted damping wigglers, each viewed on-axis, provide many-fold higher brightness than an uncanted arrangement, viewed off-axis, although the total flux is similar for both cases. The downside of canted wigglers is that they contribute somewhat to an increased beam emittance. Nevertheless on balance, the EFAC recommends that canted wigglers be employed for damping wiggler straights that will be utilized by two beamlines.

**Owner:** Ferdinand Willeke

**Action:** Consider using canted wigglers for damping wiggler straights that will be utilized by two beamlines.

**Response:** Canted wigglers are being considered in the design. The space for corresponding magnets is foreseen in the recent layout for damping wigglers. The cost of canting IDs is not included as part of the baseline cost, though. Technical difficulties to accommodate canted photon fans from the wigglers are being studied. Impact of canting on the beam emittance is understood and is in the order of 15%. Fine tuning of canting angle still needs to be performed.

## Review Tracking Report (Cont.)

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<b>Finding #:</b> F06	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** The planned use of long beamlines at NSLS-II places special demands on stability. EFAC commends the consultation with Spring8, where there have been severe problems related to long beamlines and we recommend continuing contacts to try to find out exactly what kind of instability is causing problems. In the end, we wonder whether ensuring the stability of long beamline may lead to special civil engineering requirements on the longbeamline out-stations, and in their connection to the main building.

**Owner:** Nick Simos

**Action:** Consider consulting with Spring8 on instability associated with long beamlines.

**Response:** A Spring-8 visit was conducted in the spring of 2007 and organized in an effort to perform vibration measurements in the experimental floor and the mechanical facilities which will be used to baseline numerical models and study transmissibility and correlation of vibration. An extensive array of measurements was also performed focusing on the long beam lines of Spring-8 and in particular the relation between the extraction point on the experimental floor and the end-station as well as with intermediate points. A vibration study is under way addressing the effects of the Spring-8 variability in the subsurface that exists between the ring and the long beam line end-station on the correlation of motion and the relative displacements. While major differences in the Spring-8 and NSLS-II subsurface exist, understanding both the motion correlation and most importantly the vibration characteristics of a detached facility such as an end-station of a long beam line (i.e. a much smaller foundation mat resting on either soft, as in the case of Spring-8, or sandy soil as in the case of NSLS-II) will help in conceptualizing both the design of the long beam line stations and their interface with the NSLS-II ring. Because of the importance of the long beam line issue, from both the Spring-8 and NSLS-II perspectives, a follow-up visit for further measurements and consultation with the Spring-8 team is being tentatively discussed.

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<b>Finding #:</b> F07	<b>Priority:</b>	<b>Status:</b> Open	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b>
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**Description:** However, we note that conspicuously missing from this list, but corresponding to a major user base at the NSLS and nationally, is an insertion device beamline for protein and macromolecular crystallography (PX). Although we understand that such a beamline cannot be part of the construction project scope, an important recommendation of the EFAC is that it become a key goal of the overall NSLS II effort that a state-of-the-art beamline for PX be operational as soon as NSLS II itself becomes operational. We believe that this will be important in maintaining and increasing the number of PX users at NSLS/NSLS II. To succeed in this goal will require a concerted effort by the existing NSLS PX and biology community. To facilitate such an effort, we recommend the appointment of an NSLS/NSLS II staff person - a Biology "Tzar" or "Tzarina" -- with responsibility for organizing a community effort to define what the biology program at the NSLS II will look like. For the final shape of the NSLS II biology capabilities, we envision an integrated suite of biology beamlines with a range of capabilities, including, for example, a beamline for crystal screening with advanced robotic capabilities, a beamline for high-throughput "routine" structure determination, a beamline for IR studies, a beamline for near-UV circular dichroism (CD) and micro-CD, and a beamline for determining the most challenging crystallography measurements for samples with large-unit-cells and small crystal sizes, which might be the ID line in the initial line-up.

**Owner:** John Hill

**Action:** Consider making it a goal of the overall NSLS II effort that a state-of-the-art beamline for PX be operational as soon as NSLS II itself becomes operational. Consider also, the appointment of an NSLS/NSLS II staff person - a Biology "Tzar" or "Tzarina" -- with responsibility for organizing a community effort to define what the biology program at the NSLS II will look like.

**Response:** The project is seriously considering opening a position for Deputy Division Director for life sciences. Responsibility would include developing a strategic plan for the life sciences for NSLS-II, interacting with the life science community and funding agencies, and working with the XFD Division Director to ensure that the needs of the life science community are met.

## Review Tracking Report (Cont.)

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<b>Finding #:</b> F08	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** We endorse the concept and role of the Beamline Advisory Teams (BATs). In order to make becoming a BAT member sufficiently attractive, the EFAC strongly encourages provision for BAT members to be awarded beamline access for the first several years of operations. Specifically, we envision the BAT of the construction phase, morphing into Partner Users of the operations phase, with a corresponding allocation of beamtime. Because it generally takes some period of operations before a beamline is working at its full potential, we recommend an allocation of up to 30% of the beamtime for the first three or four years of operations. The exact allocation should depend on the extent of the BAT's contributions.

**Owner:** John Hill

**Action:** Consider provisions for awarding beamline access to BAT members in the first several years of operation.

**Response:** The project has considered this question carefully, and has engaged in extensive consultation with DOE program offices, existing NSLS users, and other facilities –both x-ray and neutron. As a result of these discussions, it is felt that the model that will generate the most productive use of a facility such as NSLS-II is the general user/ partner user model. Certainly the BAT, or members of the BAT, would be able to evolve into a partner user group if they were to make additional contributions to the facility. However, there would not be preferential access of BAT members during operations, simply by virtue of the fact that they are BAT member. Of course, there will be preferential access for the BAT members during commissioning activities.

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<b>Finding #:</b> F09	<b>Priority:</b>	<b>Status:</b> Open	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b>
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**Description:** The EFAC commends the NSLS-II project for its progress on the issue of transferring programs from NSLS I. The incorporation of 3PW's into the lattice will provide nice sources with the correct spectrum to welcome a good number of beamlines from the NSLS. We strongly endorse the appointment of a NSLS-to-NSLS-II transition manager. The planning so far for a selection procedure is interesting but will need further refinement. In particular, there should be clear announcements to the NSLS user community about the philosophy of beamline management at NSLS II (i.e. that there will no longer be PRTs, in particular), and concerning the procedures and criteria that will be followed by NSLS II management in determining which beamlines and/or programs to move from NSLS to NSLS-II. The EFAC anticipates that, while some beamlines will be transferable with minor modifications, others will require significant upgrades. In either case, transferred beamlines can be expected to serve a broader set of users than at the NSLS. Therefore, the selection of which equipment to transfer from which beamlines, and which equipment to upgrade should involve the entire community in. Because there may be competing visions for what to do, we recommend that the transfer process start with some method of 'outline' proposal and peer review, perhaps by EFAC, before any commitments are made concerning which beamlines to relocate from the NSLS to NSLS II.

**Owner:** John Hill

**Action:** Consider:  
A - The appointment of a NSLS-to-NSLS-II transition manager.  
B - Communicating the philosophy on beamline management and the selection of beamlines and programs from NSLS to NSLS-II, to NSLS users.  
C - Generating an outline proposal of the transfer process for peer review, perhaps by the EFAC.

**Response:** A job description is presently being written for the NSLS- NSLS-II Transition Manager with a view to filling this position as soon as possible. It will include responsibility for managing the transition of hardware and science programs from NSLS to NSLS-II.

Discussions have been held with the existing NSLS community in regard to the NSLS- NSLS-II transition, in particular at the NSLS-II User Workshop in July 2007 and with the NSLS UEC on a regular basis. They are ongoing.

The transition plan itself and the process where by it will be developed is still under consideration. Our intent is to follow the same Letter of Intent and BAT process for these beamlines as for any other beamlines. An update will be presented at the next EFAC meeting in Oct. 2007.

## Review Tracking Report (Cont.)

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**Finding #:** F10    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** With regard to the transfer timeline, the EFAC strongly recommends that all measures possible be taken to ensure that the transfer of beamlines can happen quickly. For such items as front ends, we recommend that funds be assigned from the project for the front ends of the beamlines to be transferred first. For long-lead-time upgrade items, such as mirrors, it may be that NSLS operations funds can sensibly be used. The current proposal to exclusively use 'early operations' funds -- available only from CD-4a -- could hold up the transfer schedule and risk losing the user community. Also, we feel it important to enhance the message/perception that transfer of operations and the user community from NSLS to NSLS II is a core mission of the NSLS II project. The appointment of a transition manager will help with this too.

**Owner:** John Hill

**Action:** Consider all measures that can be taken to ensure that beamline transfers happen quickly. Consider using project funds for items such as front ends. Also, consider enhancing the message/perception that transfer of operations and the user community from NSLS to NSLS-II is a core mission of the NSLS-II project.

**Response:** Unfortunately, there is no room within project funds to pay for front ends for these beamlines. Nevertheless, we are actively working to provide operating funds as early as possible to speed this transfer. It is hoped that the transition manager will demonstrate to the community the project's commitment to this process.

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**Finding #:** F11    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** EFAC requests that the plans and needs of existing PRTs be addressed on a case-by-case basis. We accept the constraints imposed by DOE, but we hope that some executive control and involvement can be retained by erstwhile PRT scientists. We are particularly concerned about the scientists at IBM, NIST, Exxon, NRL, and any remaining university-based PRT groups, and we recommend discussions start with each of these groups as soon as possible, with a status report at the next EFAC meeting. We are less concerned about DOE-funded PRT groups, such as BNL departments. In this case, it may be that use of joint appointments (e.g. a NSLS-II/Biology joint appointments or an NSLS-II Materials Science joint appointment) can resolve many issues. We certainly do not wish to discourage other areas of DOE from continuing their support of synchrotron-based research at NSLS II.

**Owner:** John Hill

**Action:** Consider discussions with existing PRTs, on a case-by-case basis, about their plans and needs. Consider providing a status report to the CFAC at the next meeting.

**Response:** Such discussions have been happening, and will continue to do so. In particular, we have had discussions with NIST, IBM, Case-Western and others.

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**Finding #:** F12    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** The beam in the machine is expected to have a small lifetime, and hence will operate in top-up mode. Accordingly, there will be significant beam losses, most of which can be expected to occur near the transition to the small gap at the IDs. Studies should be carried out to understand the damage to the magnets due to this beam loss - in particular, how their magnetic field is affected -- both for traditional magnetic materials and the for proposed new materials.

**Owner:** Ferdinand Willeke

**Action:** Consider commissioning studies to understand the damage to magnets from beam losses.

**Response:** The damage of insertion devices due to radiation from lost particles is being studied and a certain amount of understanding has been gained already. Some design features of vacuum system at other facility which contribute to enhanced radiation damage is identified and should be able to be avoided in NSLS-II insertion devices vacuum design. A beam loss monitor system to detect the locations of particle losses in NSLS-II is foreseen and discussed at this point. This will make analysis of particle losses during commissioning time possible.

## Review Tracking Report (Cont.)

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**Finding #:** F13    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** NSLS II is expected to operate with small emittance, and the beam stability will be a very important issue. Hence understanding the effect of the IDs on the beam is an important task. This will involve measuring the magnetic fields of the ID prior to installation and even providing some "shimming" to correct for field errors measured. This magnetic measurement will be a special challenge for the proposed in-vacuum undulators. The EFAC recommends that an earnest R&D effort be initiated in this area as it is essential that these IDs perform to design specifications for the success of the whole project.

**Owner:** Ferdinand Willeke

**Action:** Consider performing R&D on the effect of the IDs on beam stability.

**Response:** A magnetic measurement lab for certifying insertion devices is considered necessary and there are plans to implement such a laboratory. Details of this lab such as exact location and needed equipment are under discussion at this point and are being prioritized together with other R&D items. The impact of realistic insertion devices on the beam dynamics including modeling of realistic ID's and impact on the dynamic aperture and the beam life time are on-going study programs.

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**Finding #:** F14    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** Horizontal extraction, using a planar mirror inside the dipole chamber, is a more typical extraction geometry than that proposed previously, and is in use at several synchrotron facilities, which reinforces the notion that this scheme will result in the most efficient photon collection. This first mirror location inside the standard and large gap dipole chambers should not impact into the impedance. Calculations should be carried out as soon as possible to finalize the extraction geometry.

**Owner:** Ferdinand Willeke

**Action:** Consider performing calculations to finalize the extraction geometry.

**Response:** We are planning on carrying out impedance calculations for the infrared mirrors.

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**Finding #:** F15    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** The heat load issue should be more carefully addressed. Of particular concern is the slotted option for the first mirror, which should be sized to restrict the heat load on the mirror to a reasonable power (10 to 40W). Any cooling system should be sure to minimize any source of mirror vibration. The slot in the first mirror could allow for a downstream soft x-ray beamline. The feasibility of this option should be investigated further, to ensure that it does not compromise the IR extraction.

**Owner:** Ferdinand Willeke

**Action:** Consider further studies of the heat load issue, including the feasibility of the slotted option for the first mirror.

**Response:** Slotted mirrors are a standard technique used in synchrotron radiation monitoring which have been used at several accelerators. In-vacuum cooling is also an issue with respect to integrity of the vacuum system and should be avoided.

## Review Tracking Report (Cont.)

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<b>Finding #:</b> F16	<b>Priority:</b>	<b>Status:</b> Open	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b>
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**Description:** An extraction mirror located inside the standard infrared dipole chamber may offer an alternative solution for beam extraction up to the ultraviolet energy domain (larger horizontal angle, closer distance to the source). The EFAC recommends that detailed calculations be carried out to investigate what is the minimum slot size that would be compatible with efficient UV beam extraction, while keeping the mirror cooling requirements reasonable. We request that the results of such calculations be presented at the next EFAC meeting.

**Owner:** Larry Carr

**Action:** Consider performing detailed calculations to determine the minimum slot size for an extraction mirror, that would be compatible with efficient UV beam extraction.  
Consider presenting the results of these calculations at the next EFAC meeting.

**Response:** NSLS-II work activity focused on the impedance issues for the first extraction mirror since this will affect the dipole chamber design, which is a more pressing issue for the NSLS-II accelerator final design, cost and risk. The details for the width of a slot to allow efficient UV extraction will not affect the chamber design, so the analysis of this slot is not a time-critical task and was deferred.

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<b>Finding #:</b> F17	<b>Priority:</b>	<b>Status:</b> Open	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b>
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**Description:** The first mirror (M1) of the IR beamline is the most critical component, and several issues must be addressed at this stage. Due to the blackening of the first mirror, often observed at other synchrotron facilities, one might consider making the first mirror retractable for inspection and/or replacement, if necessary. The EFAC acknowledges that the retractable option of M1 is not the most favourable ones, since vibration isolation, position reproducibility, long travel motion for extraction M1 are all technically challenging, but, we believe, doable. Earlier decisions about the first mirror options may help initiating an R&D project in order to validate all the critical issues well before installation inside the dipole chamber. In particular, thermal sensors at the near edge of the slot might be considered for surveying any unexpected heat load, which would damage the first mirror.

**Owner:** Larry Carr

**Action:**

**Response:** Mirror blackening was an issue for early IR beamlines (and other beamlines too), but this issue has mostly disappeared as vacuum and material quality improved. Nonetheless, the ability to retract the 1st mirror is recognized to be an important requirement to allow for NSLS-II operations with beam in a non-standard orbit (intentional or otherwise).

There are examples from other facilities (e.g., SPRing-8) where the x-ray beam inadvertently struck the mirror and quickly damaged it. A retractable mirror design that fits the storage ring, ratchet wall, and presence of adjacent beamlines will be developed in concert with the other front-end x-ray beamline designs. This will be completed at a later date (for presentation at a subsequent EFAC meeting).

Additionally, damage from the x-ray beam of a 3rd generation source can occur rapidly. We will plan to design a thermal sensing system that can detect a shift of the orbit and dump the beam before physical damage to the mirror can occur. Proper placement of sensors (i.e., not buried inside the mirror itself) will be investigated to ensure a sufficiently rapid response.

## Review Tracking Report (Cont.)

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**Finding #:** F18    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** The distance from the infrared source to the infrared instrument is quite long in conventional beamline set up (along the electron trajectory). This is not a problem in the mid-IR regime, as long as the optical elements are very well optimised and figure errors kept into the usual specifications (which are, however, less severe than for X-ray optics). However, the large gap dipole will be dedicated to far-infrared. For efficient use of the long wavelength radiation (of hundreds of microns), and considering the large depth of the source for these energies, the design of the shortest beamline possible is recommended. Extraction perpendicular to the electron trajectory should be considered. In order to release the radioprotection constraints outside the tunnel wall, an extraction outside the tunnel, through the roof, should be worked out, as such extraction has been achieved satisfactorily at the ERSF facility.

**Owner:** Larry Carr

**Action:**

**Response:** Keeping the far-IR beamlines as short as possible is also a design goal, and an extraction perpendicular to the orbit is presently our intended design route. From there, extraction through the roof is a likely approach (as employed at ESRF and SPRing-8), although we will consider extraction horizontally through the ratchet wall if radiological protection is manageable and it provides a more direct (shorter) route to the endstation area. A key aspect for determining the distance from beam extraction to experiment endstation will be the presence of other beamlines that are conventionally arranged along orbit tangents and therefore remain near to the shield/ratchet wall. Once the footprint for the various x-ray beamline front ends is determined, the available space and geometry for far-IR beamline endstations can be identified and allocated/reserved. There is some flexibility for locating the large gap dipole sets, and if possible they will be arranged to match the optimal floor space locations.

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**Finding #:** F19    **Priority:**    **Status:** Closed    **Scheduled Close:** 10/4/2007    **Actual Close:** 10/3/2007

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**Description:** The large gap dipole being situated before a 3 pole wiggler, a possible space constraint might come from the proximity of the extracted beam to the tunnel wall. This should be worked out rapidly, to validate the horizontal extraction, and to not further complicate the vertical deviation by the second mirror.

**Owner:** Sushil Sharma

**Action:** Consider studies to validate the horizontal extraction.

**Response:** Conceptually, no interference is anticipated between an IR frontend and a 3-pole wiggler (or BM) frontend. The detailed layout of the frontends will begin in earnest, once the design specifications, which are currently being developed, are complete.

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**Finding #:** F20    **Priority:**    **Status:** Open    **Scheduled Close:** 10/4/2007    **Actual Close:**

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**Description:** Folding the far-IR beamline perpendicular to the electron beam trajectory might end up with a space constraint while crossing the adjacent beamline. Careful beamline implementation, accounting for the far-IR beamline location should be investigated at this stage.

**Owner:** Larry Carr

**Action:** Consider investigating beamline implementation, accounting for the far-IR beamline.

**Response:** Will develop a design once the details of the adjacent beamline front ends are reasonably refined and known.

## Review Tracking Report (Cont.)

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<b>Finding #:</b> F21	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** In considering future challenging scientific programs at NSLS-II, the combination of techniques should be also considered at early stage, since this might guide the implementation of adjacent beamlines. If manufacturing cost is not too much higher, installation of several mid-IR at other locations around the ring (in addition to the ones planned for the early phases of NSLS-II operations) would allow for program growth, including bending magnet VUV beamlines.

**Owner:** John Hill

**Action:** Consider installation of several mid-IR beamlines at other locations around the ring (in addition to the ones planned for the early phases of NSLS-II operations).

**Response:** There is now provision to extract mid-IR from any dipole. The ultimate distribution of mid-IR vs. soft x-ray and hard x-ray use in the fully built-out facility will be determined by the BAT process, the facility's strategic plan and the EFAC.

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<b>Finding #:</b> F22	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** At this EFAC meeting, we did not hear a presentation concerning detectors. With the increased funds now projected to be available as a result of the CD 1 review, we trust that it will now be easier to allocated sufficient funds for detector development. For now, we repeat what we wrote in the last EFAC report: "We especially recognize the importance of developing highly-capable, special-purpose x-ray detectors in order to fully exploit the unique brilliance of NSLS II. Indeed the proposed detector projects may represent a new "smart" detector paradigm. Detector development has long lagged far behind the accelerator and optics portions of a synchrotron experiment, and we encourage a faster ramp-up of this program, even if that involves more resources." The EFAC requests to hear a presentation concerning detector development at our next meeting.

**Owner:** John Hill

**Action:** Consider accelerating the schedule for detector development.  
Consider providing a presentation on detector development at the next EFAC meeting.

**Response:** There is a major BNL-based proposal, led by Peter Siddons, for just such work, which the project fully supports and anticipates taking advantage of. Peter Siddons will give a presentation at the next EFAC.

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<b>Finding #:</b> F23	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** A key goal for NSLS II is to achieve a useful focused 1 nm-sized x-ray beam. To this end, we heard an update concerning the two possible routes to 1-nm-sized spot sizes that will be pursued as R&D efforts at the NSLS II: kinoform lenses and multi-layer Laue (MLL) lenses. Important progress towards focusing with kinoforms was reported. This included the achievement of a spot size of no more than 46 nm. In addition, theoretical questions described at the last EFAC meeting about the ultimate spot size achievable with kinoforms have been largely removed. We applaud the proposed hiring of a theoretician who will be able to further elucidate kinoform optical performance. Finally, we learned that more of the kinoform manufacturing is now occurring on-site. Overall, we are impressed by the progress made. There was less concrete progress to report on the MLL side, although hiring plans are well-advanced. We continue to believe that the successful development of MLL lenses capable of focusing to 1 nm presents a number of major materials growth challenges, including the precise engineering of the layer thicknesses, which must vary over a wide range through the growth process and the precise engineering of the layer tilt, i.e. step density, which also varies through the growth process. Because of these challenges, we urge the establishment of key milestones for this effort to ensure that timely progress towards a deliverable 1-nm lens is made in this effort.

**Owner:** John Hill

**Action:** Consider the establishment of key milestones for the development of MLL lenses capable of focusing to 1 nm.

**Response:** This is a legitimate concern. We are developing a set of milestones for this project. In addition, Han Fei Yan has joined the project to work on this effort. He will present at the next EFAC.

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## Review Tracking Report (Cont.)

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<b>Finding #:</b> F24	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** It seems clear that this and other NSLS optics R&D efforts would very greatly benefit from regular access to high-brilliance x-rays. To this end, the EFAC strongly recommends that NSLS II arrange for regular access to an APS optics beamline by agreement with the APS.

**Owner:** John Hill

**Action:** Consider arranging for access to APS optics beamlines to advance optics R&D efforts.

**Response:** Preliminary discussion with the APS has begun for access to a number of beamlines for optics R + D.

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<b>Finding #:</b> F25	<b>Priority:</b>	<b>Status:</b> Closed	<b>Scheduled Close:</b> 10/4/2007	<b>Actual Close:</b> 10/3/2007
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**Description:** Finally, the EFAC requests that we get copies of the presentation at least one day prior to the EFAC meeting. We would also like to hear a summary of the most recent comments from the ASAC and CFAC at the start of each EFAC meeting.

**Owner:** John Hill

**Action:** Consider providing copies of the presentation at least one day prior to the EFAC meeting. Also, consider providing a summary of the most recent comments from the ASAC and CFAC at the start of each EFAC meeting.

**Response:** We will endeavor to post the presentations ahead of the next meeting. The ASAC and CFAC reports (and presentations) were sent to the EFAC a week prior to the Oct. 2007 meeting.