NSLS-II Beamline Development Policy

May 25, 2011

TABLE OF CONTENTS

ACRONYMS

ALD	Associate Laboratory Director for Photon Sciences
BES	Basic Energy Sciences
BAT	Beamline Advisory Team
BDA	Beamline Development Agreement
BDG	Beamline Development Group
BDP	Beamline Development Proposal
BHSO	Brookhaven Site Office
BNL	Brookhaven National Laboratory
BPEP	Beamline Project Execution Plan
DOE	U.S. Department of Energy
EFD	NSLS-II Experimental Facilities Director
ES&H	Environment, Safety and Health
LOI	Letter of Intent
NSLS	National Synchrotron Light Source
NSLS-II	National Synchrotron Light Source-II
SAC	Photon Sciences Directorate Science Advisory Committee

NSLS-II BEAMLINE DEVELOPMENT POLICY

APPROVALS

Approval:

May 25, 2011

Steven Dierker Date
Associate Laboratory Director for Photon Sciences
Brookhaven National Laboratory

CHANGE SYNOPSIS

Effective Date	**Summary of Change**
March 26, 2010	Initial official release
February 14, 2011	Added the procedure to change from Type-I to Type-II proposal or from Type-II to Type-I after proposal approval; Changed Light Sources Directorate to Photon Sciences Directorate
May 25, 2011	Changed page limit from 10 to 12 pages. Added content about beamline comparisons with those at other facilities and with already approved beamlines at NSLS-II

NSLS-II BEAMLINE DEVELOPMENT POLICY

1. SUMMARY:

The Photon Sciences Directorate at Brookhaven National Laboratory is constructing the National Synchrotron Light Source II (NSLS-II) facility. NSLS-II will be a highly optimized 3rd generation synchrotron that will provide ultra-high brightness and flux as well as exceptional beam stability over a broad range of photon energies from infrared to hard x-rays. NSLS-II will be able to accommodate at least 58 beamlines for scientific programs, with additional beamlines possible through canted insertion devices and multiple hutches. These experimental facilities will support a large user program that carries out research in such diverse fields as biology and medicine, chemistry and environmental sciences, physics, and materials science.

This policy provides a concise overview of the mechanisms by which beamlines are developed at NSLS-II. The processes for beamline development described in this document apply to development of all beamlines irrespective of who is responsible for the development, the funding source, or the type of beam port used (i.e., insertion device straight, 3-pole wiggler, bend-magnet, or IR port). NSLS-II has overall responsibility to ensure the successful development of all beamlines.

The successful initiation of development of any beamline at NSLS-II begins with a Letter of Intent (LOI), then a Beamline Development Proposal (BDP), and finally with a Beamline Project Execution Plan (BPEP). The LOI identifies the beamline Proposal Team that intends to submit a BDP and provides a brief description of the science program and type of beamline. The BDP describes the scientific programs that such a beamline would serve and the main technical requirements that the beamline must meet to enable those programs. The BPEP describes the membership of the BAT, the plan for formation of the Beamline Development Group (BDG), the plan for managing and executing the design and construction of the beamline, the pre-conceptual technical design, the preliminary cost and schedule estimates, and a commitment for the necessary funding. This process flow for beamline development is illustrated in Figure 1.

Submitted Beamline Development Proposals will undergo peer-review and must receive the recommendation of the BNL Light Source Directorate Science Advisory Committee (SAC) and the approval of the Associate Laboratory Director (ALD) for the Photon Sciences Directorate. Approval of a Beamline Development Proposal authorizes development and submission of a Beamline Project Execution Plan, which must also be approved by the ALD. Approval of the Beamline Project Execution Plan results in allocation of a beamport and experimental floor space for use by the beamline and authorization to begin design and construction of the beamline.

Each beamline at NSLS-II will be designed and built by a Beamline Development Group (BDG) that is led by a Beamline Project Director. The Beamline Project Director will have management responsibility for developing the beamline, including: securing and managing funding; hiring and supervising the Beamline Development Group; ensuring that the design and construction of the beamline is carried out on time and on budget and that it delivers the required capabilities; and appointing and being responsive to the Beamline Advisory Team that oversees the Beamline Development Group on behalf of the user community. The BAT for the beamline and NSLS-II

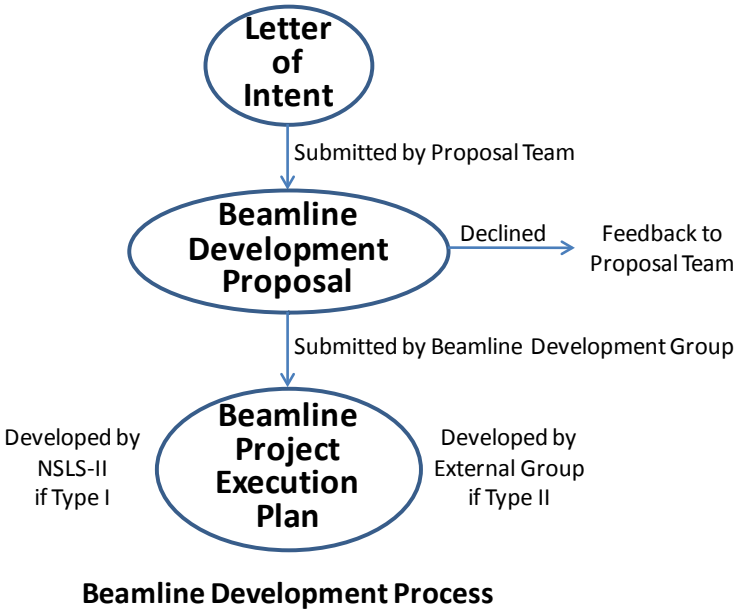

Figure 1 *Illustration of the steps involved in initiating development of a beamline at NSLS-II.*

will oversee the work of the Beamline Development Group in designing and constructing the beamline.

Funding for the design, construction, and operation of the majority of the experimental facilities at NSLS-II is expected to be provided directly to NSLS-II by the DOE Office of Basic Energy Sciences (BES) for beamlines relevant to BES mission-needs, or by other sponsors for beamlines and/or instruments relevant to their mission needs. However, this policy does not preclude external groups from seeking funding and either self-performing, or contracting to NSLS-II, the design and construction of beamlines at NSLS-II. These two types of beamline development are referred to as Type I beamline development (i.e., NSLS-II is responsible for securing the funding and designing and constructing the beamline) and Type II beamline development (i.e., a group external to NSLS-II is responsible for securing the funding and designing and constructing the beamline).

The principle roles and relationships for Type I beamline development are illustrated in Figure 2. In this case, the ALD seeks funding on behalf of NSLS-II and allocates the funding to the NSLS-II Beamline Project Director for development of that beamline. The NSLS-II Beamline Project Director manages the beamline construction project, hires and supervises the Beamline Development Group, and appoints the BAT.

The principle roles and relationships for Type II beamline development are similar to those for Type I beamline development, as illustrated in Figure 3. In this case, the Beamline Project Director is responsible for securing funding, hiring and supervising the Beamline Development Group, and appointing (with the concurrence of NSLS-II management) the BAT. The Beamline Project Director should wait until the submitted Beamline Development Proposal is approved before soliciting funding for the development of the beamline.

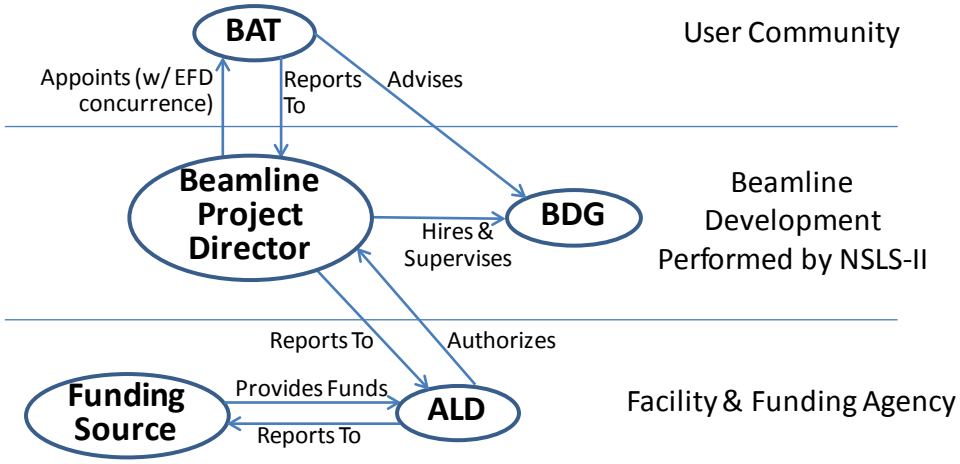

Figure 2 *Illustration of principle roles and relationships for Type I beamline development. In this case, the Beamline Project Director and the Beamline Development Group are internal to NSLS-II.*

In certain cases, the proposal team of an approved Beamline Development Proposal may request, by sending a letter to the Photon Sciences ALD, to change the Type of the proposal from Type I to Type II or vice versa. The request will be evaluated by Photon Sciences management based on the qualifications of the proposal team, what considered to be in the best interests of the user community, and on the likelihood of obtaining funding commitment if the change is approved. The final decision rests with the ALD, and will be communicated to the proposal team in a timely manner.

Beam time access during operations on all beamlines at NSLS-II will be in accord with the NSLS and NSLS-II User Access Policy, regardless of who develops or operates the beamline or who provides the funding for its development or operation. A Beamline Operations Policy is being developed and will be issued at a future date to define policies with respect to operation of beamlines.

2. Beamline Development Proposals

Development of the experimental facilities at NSLS-II begins with a team of engaged scientists who represent a segment of the scientific community and who submit a Beamline Development Proposal to NSLS-II to propose that a specific beamline based on a specific set of experimental techniques be built to carry out a particular scientific mission. Any individuals may be members of a beamline Proposal Team and submit a Beamline Development Proposal, including staff of the Photon Sciences Directorate as well as members of the external user community.

A separate Beamline Development Proposal should be submitted for each individual beamline that is independently provided radiation by a single source. If more than one endstation is provided radiation by the same source, these endstations are considered branches of a single beamline and not separate beamlines and only one Beamline Development Proposal would be required.

In some cases, a beamline may only use the radiation from one of two canted insertion devices in a given straight section. It may be that the straight section could accommodate a second insertion device to simultaneously provide radiation to a second beamline sharing space on the experimental floor with the first beamline. In such cases, a separate Beamline Development Proposal must be submitted for each of these proposed beamlines. Proposal Teams wishing to submit a Beamline Development Proposal for such a beamline are strongly encouraged to discuss their ideas with the NSLS-II Experimental Facilities Director before submitting their LOIs.

In some cases, a team may wish to propose a suite of beamlines that have a high degree of commonality in the proposed techniques and/or scientific missions. In such cases, a separate Beamline Development Proposal must be submitted for each proposed beamline in the suite. The role and importance of the proposed beamline in the context of the suite and the impact if the proposed beamline is not approved should be described in the proposal. Proposal Teams wishing to submit such a suite of Beamline Development Proposals are strongly encouraged to discuss their ideas with the NSLS-II Experimental Facilities Director before submitting their LOIs.

Type I Beamline Development Proposals may optionally include suggestions of individuals to serve as members of the BAT for the proposed beamline. Nominees for BAT membership must have agreed to serve if asked and may include, but are not limited to, Proposal Team members.

Type II Beamline Development Proposals must describe the Proposal Team's plans for seeking their own funding to develop the beamline and briefly describe their approach for managing the beamline development. Type II proposals should be submitted by the proposed Beamline Project Director and any collaborators in the Beamline Development Group.

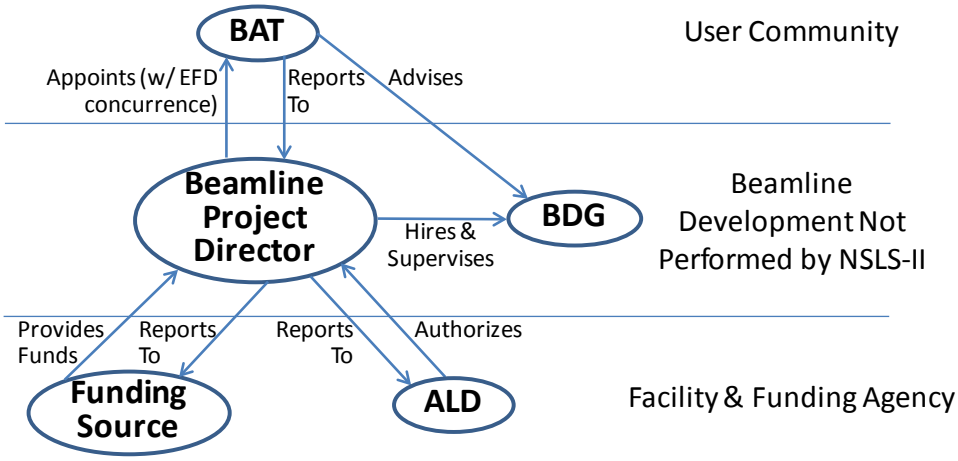

Figure 3 *Illustration of principle roles and relationships for Type II beamline development. In this case, the Beamline Project Director and the Beamline Development Group are external to the Photon Sciences Directorate.*

Beamline Development Proposals can be submitted at any time, but the reviews of the submitted Beamline Development Proposals are typically performed once a year as specifically outlined in a Call for NSLS-II Beamline Development Proposals.

NSLS-II intends to announce a Call for Beamline Development Proposals on an annual basis.

2.1 Letter of Intent

Proposal Teams planning to submit a Beamline Development Proposal are requested to submit a LOI at least two months prior to the deadline for submitting the Beamline Development Proposals. The LOI serves to inform NSLS-II management about a forthcoming Beamline Development Proposal and enables us to better prepare for the review process by knowing how many, and what kind, of proposals may be expected. Submission of a LOI is not a prerequisite to submitting a Beamline Development Proposal, and a Beamline Development Proposal can be submitted without a LOI. However, teams are strongly encouraged to submit a LOI.

The LOI should include:

- descriptive title of proposal
- one sentence description of science program
- one sentence description of beamline (principal technique and type of source)
- whether the proposal is Type I (NSLS-II seeks funding and develops beamline) or Type II (the proposing group seeks funding and develops beamline) and potential sources of funding if Type II
- name and contact information for all Proposal Team members (name, title, affiliation, address, telephone number, and e-mail address)
- Identification of one Proposal Team member who will act as the Proposal Spokesperson, in the case of Type I proposals, or as the Beamline Project Director, in the case of Type II proposals

If a Type I proposal is approved, the proposal spokesperson is expected to work with the NSLS-II Experimental Facilities Director in forming the beamline BAT and to serve on the BAT and represent the interests of the proposal team if the Beamline Project Execution Plan is approved.

The LOI is not binding and does not enter into the review of a subsequent Beamline Development Proposals submission. The information that it contains is only to allow staff to estimate the potential review workload and plan for the review.

The LOI is to be sent by email by the date listed on the specific announcement and to the contact and address listed in the announcement.

2.2 Required Content of Beamline Development Proposal

BDPs should contain the following information and should be a maximum of 12 pages long:

1. Beamline title and a three-letter acronym.

2. Indicate whether it is a Type I or a Type II proposal.
3. Name and contact information for all Proposal Team members (name, title, affiliation, address, telephone number, and e-mail address). One team member who will act as the team Spokesperson (Type I proposals) or Beamline Project Director (Type II proposals) should be identified.
4. A succinct statement of the scientific case for the beamline, including a description of the key scientific questions the beamline will address, the capabilities that establishing such a beamline at NSLS-II will provide and whether any of these would be unique, and how these would impact the field and the community. If the beamline is being proposed as part of a suite of beamlines, indicate the role and importance of the proposed beamline in the context of the suite and the impact if the proposed beamline is not approved.
5. Description of the pre-conceptual layout of the proposed beamline, including technical requirements and specifications and justification for why these are necessary to address the intended scientific mission. These should span from the radiation source to the endstation(s). Describe any special source parameter requirements such as pulse length, repetition rate, coherence, stability, etc. For insertion devices, indicate preferred type of straight section (high or low beta). For bending magnet ports, indicate the required type of sources - standard bend magnet, 3-pole wiggler, or infrared. Include a summary of the expected performance with emphasis on the appropriate utilization of NSLS-II. Also include a brief analysis indicating how the proposed beamline compares in performance with similar beamlines (existing or under construction) at other facilities and in programmatic focus, capability, and capacity with already approved beamlines at NSLS-II.
6. A description of any technical advances required for the proposed beamline to achieve the level of performance required by the proposal.
7. Evidence of user demand for the capabilities to be provided by the beamline. This could include, but is not limited to, evidence from historical usage of similar beamlines at other facilities, user workshops held, white papers written, etc. An optional appendix (not included in the page count) containing a list of supporters/potential users may be attached to the Beamline Development Proposal.
8. Describe the expertise and experience of each Proposal Team member. Include an appendix (not included in the page count) with a one page bio for each Proposal Team member including publication references.
9. (Type I proposals) Optionally include suggestions of individuals who are willing to serve as BAT members for the proposed beamline (in addition to the proposal spokesperson). Nominees for BAT membership must have agreed to serve if asked and may include, but are not limited to, the Proposal Team members. If the proposal is approved, the proposal spokesperson is expected to work with the NSLS-II Experimental Facilities Director in forming the beamline BAT, and to serve on the BAT and represent the interests of the proposal team if the Beamline Project Execution Plan is approved. Full contact information should be provided for each nominee (not included in the page count).
10. (Type II proposals) A succinct statement of plans for seeking funding and a succinct description of approach for managing the beamline development. (not included in page count).

3. Beamline Development Proposal Review

Submitted Beamline Development Proposals will be reviewed by the SAC. To ensure effective and fair evaluation of each proposal, each team proposing that a beamline be established at NSLS-II will be given the opportunity to present their case in person to the SAC. Reviews by the SAC will include evaluation of both the written proposal and the oral presentation. The SAC will make a recommendation to the ALD on whether or not to approve each proposal.

3.1 Review Criteria

The reviewers are asked to apply the following review criteria:

- **Science Case**: Does the research enabled by establishment of the proposed beamline have the potential to address important scientific and/or societal questions?
- **User Demand**: Is there evidence of significant interest, engagement, and support for the proposed beamline facility by the scientific community?
- **Performance**: Will the proposed beamline provide the performance necessary to fulfill its scientific mission, with characteristics well matched to the NSLS-II source?
- **Technical Feasibility**: Is achieving the proposed beamline capabilities technically feasible?
- **Quality of Proposers**: Are the proposal team members experienced in the proposed field of research and/or technique and are they representative of the corresponding user community that would be served by the beamline?

3.2 Review Outcomes

Based on the reviews by the SAC and the evaluation of NSLS-II management, the NSLS-II Experimental Facilities Director will make a recommendation to the ALD on whether or not to approve the proposal. The final decision of the ALD and the reasons for it will be conveyed in writing to the Proposal Team along with the reviewer's comments and the feedback from the SAC. There are three possible outcomes to the review of Beamline Development Proposals.

3.2.1 Approved Type I Beamline Development Proposals

If a Type I Beamline Development Proposal is approved, the ALD will seek funding on behalf of NSLS-II for developing the beamline. The Proposal Team will be kept apprised of the status of those efforts. If successful, NSLS-II will prepare and seek approval of a Beamline Project Execution Plan. The proposal spokesperson is expected to work with the NSLS-II Experimental Facilities Director in forming the beamline BAT and to serve on the BAT and represent the interests of the proposal team if the Beamline Project Execution Plan is approved.

3.2.2 Approved Type II Beamline Development Proposals

If a Type II Beamline Development Proposal is approved, then the Proposal Team is encouraged to seek funding to develop the beamline and to prepare and submit a Beamline Project Execution Plan for approval. A letter of support is provided by NSLS-II stating that the team will be

allowed to develop the beamline at NSLS-II provided they submit a Beamline Project Execution Plan that meets the requirements for approval. Up to two years can elapse between approval of the Beamline Development Proposal and submission and approval of a Beamline Project Execution Plan. A beamport of the required type and the required experimental floor space are reserved for the potential use by the beamline during this period. However, assignment of these to a specific location will not occur until a Beamline Project Execution Plan is approved. If two years elapse without submission and approval of a Beamline Project Execution Plan, the beamport and experimental floor space are no longer reserved and the team must resubmit the Beamline Development Proposal for re-approval.

3.2.3 Beamline Development Proposals Not Approved

If the Beamline Development Proposal is not approved and the Proposal Team wishes to resubmit the Beamline Development Proposal, they may do so in a future proposal review round. In doing so, they are advised to revise the Beamline Development Proposal to respond to the reviewers' comments and feedback from the SAC.

4. Beamline Project Execution Plan

Following approval of the Beamline Development Proposal and securing the resources required to develop the beamline, the Beamline Project Execution Plan can be submitted for review and approval by the ALD. This is required for both Type I and Type II Beamline Development Proposals.

The Beamline Project Execution Plan presents the plans for beamline project execution, including the scientific need and justification; project objectives and description; management systems; environment, safety, health, and security; resource planning; transition to operations; project controls (management, the baseline, and change systems); and reporting.

The Beamline Project Execution Plan serves three basic functions. First, it describes the management and project execution processes that have been approved by NSLS-II management. In short, the Beamline Project Execution Plan constitutes the authorizing document for the “way of doing business” on the project. Second, the Beamline Project Execution Plan establishes the project baseline (technical, schedule, and cost) against which project execution will be measured. Changes to project execution will be evaluated in terms of baseline impacts. Through graduated change control authority, appropriate levels of management become involved in decisions regarding project changes. Third, the Beamline Project Execution Plan serves as the primary reference document for all levels of the project team and the primary source document for technical requirements, policies, and procedures for resource allocation, procurement, budgeting and finance, work authorization, management, reporting, reviews, and evaluations.

Upon approval of the Beamline Project Execution Plan, a Beamline Development Agreement will be executed between NSLS-II and the Beamline Development Group that outlines the rights and obligations of the Beamline Development Group and assigns a beamport and experimental floor space for use by the beamline.

The following are some of the required elements of the Beamline Project Execution Plan. A Beamline Development Guide will be issued at a future date to provide additional information and definition of requirements for the Beamline Project Execution Plan.

4.1 Beamline Advisory Team

In order to ensure engagement of the scientific community, to encourage novel ideas, and to ensure that every beamline built at NSLS-II will best serve the interests of the user community, the design and construction of every beamline will be overseen by a Beamline Advisory Team. BATs play critical advisory roles during the development of a beamline at NSLS-II.

The roles of the BAT include:

- represent the interests of each scientific community that has a significant interest in using the beamline as described in the Beamline Development Proposal or identified in the review process
- advise the Beamline Development Group on the scientific mission and technical requirements for, and on the design, construction, and commissioning of, the beamline
- participate in periodic project and design reviews
- report to the Beamline Project Director

The BAT will work with the Beamline Development Group to provide feedback and input on the design of the beamline to ensure that it meets the science mission needs of that beamline and includes innovations to achieve best-in-class performance. Regular reports will be made to the Beamline Project Director. During commissioning and early operations of the beamline, BAT members may play a key role in ensuring the beamlines are fully operational, up to and including running initial experiments.

Upon approval of the Beamline Development Proposal, the Beamline Project Director appoints the BAT membership. BAT appointments must have the concurrence of the NSLS-II Experimental Facilities Director. BAT members are individuals and not institutions. Individuals may participate in more than one BAT and BAT membership may include NSLS and NSLS-II staff members. However, no BAT member may also be a member of the Beamline Development Group that the BAT oversees. The Beamline Project Director will appoint one member of the BAT to serve as the BAT Chair.

Each BAT will have a Charter that outlines the roles, responsibilities, and authorities of the BAT. The Charter must include the items in the NSLS-II model BAT Charter as well as any items the Beamline Development Group wishes to add. The BAT Charter and a list of BAT members (including who will be BAT Chair) are required elements of the Beamline Project Execution Plan.

4.2 Beamline Development Group

The design and construction of every beamline at NSLS-II will be carried out by a group of individuals in sufficient number, and with the appropriate expertise and experience, necessary to

be successful. This group is expected to include technical staff, consisting of scientists, engineers, designers, and technicians, as well as management, professional, and administrative staff sufficient to enable the group to effectively execute the required management systems and to support the technical staff.

The Beamline Project Execution Plan must include an analysis of the Beamline Development Group staffing required to successfully design and construct the beamline, including the number and type of positions to be filled, the qualifications required for those positions, and the anticipated start and end dates for those positions.

4.3 Organization and Management Systems

The Beamline Project Execution Plan must include a description of the roles and responsibilities of the Beamline Development Group key personnel and the management systems that govern how the Beamline Development Group will function. The required management systems include: organization and responsibilities; work breakdown structure; acquisition strategy; work authorization and management of funds; financial management; quality assurance; project monitoring, assessment, and reviews; value management; systems engineering; risk management; configuration management; document and records management; and research and development activities management.

4.4 Beamline Pre-conceptual Design

The Beamline Project Execution Plan must include a pre-conceptual design of the beamline which contains sufficient detail to be an adequate basis for estimating the technical performance and defining the scope of the beamline. The pre-conceptual design must include an analysis of the major technical risks associated with constructing the beamline to deliver the stated performance goals and plans for mitigating those risks.

4.5 Beamline Preliminary Cost and Schedule Estimate

The Beamline Project Execution Plan must include a preliminary estimate of the cost range and schedule for designing and constructing the beamline. The cost and schedule estimates must include an analysis of cost and schedule risks and an estimate of the cost and schedule contingency necessary to assure successful completion of the beamline. An estimate of the anticipated cost and obligation profiles must also be provided.

4.6 Funding Commitment

The Beamline Project Execution Plan must include evidence of a funding commitment sufficient to successfully complete the project. The profile of available funding must be sufficient to meet the anticipated obligation profile.