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CONFIGURATION MANAGEMENT PLAN

FOR THE

NSLS-II EXPERIMENTAL TOOLS (NEXT) PROJECT



AUGUST 11, 2016

NSLSII-NX-PLN-001

REVISION 6

CONFIGURATION MANAGEMENT PLAN

FOR THE

NSLS-II EXPERIMENTAL TOOLS (NEXT) PROJECT

AUGUST 11, 2016

PREPARED BY:

8/11/2016

X 

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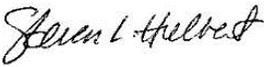
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By approving this plan I acknowledge the requirements set forth herein and agree with its implementation.

REVISION HISTORY

REVISION	DESCRIPTION	LIST OF REVIEWERS	DATE
1	First Issue		JUL2011
2	Updated Table 9.2 Configuration Management Change Thresholds (deleted level 4 change) to be consistent with the NEXT Project Execution Plan. Updated section C of PCR form to indicate updated WBS.		JUL2012
3	Updated Table 9.2 Configuration Management Change Thresholds to be consistent with the NEXT Project Execution Plan. Updated section C of PCR form to indicate updated WBS. Updated Appendix C CCB Charter membership for Common Beamline Systems Manager.		FEB2013
4	Revised Section 9.1.5 and updated Table 9.2 to include a Level 4 PCR change level for administrative changes. Also updated Appendix C and PCR Form to reflect L Stiegler as the ESH Coordinator. Miscellaneous edits made for clarity.		APR2013
5	Revisions to Table 9.2. ESH Coordinator replaced by ESH Manager, for consistency with NEXT PEP. Revisions to Concurrence and Approvals page.		JUN2013
6	Updated to reflect changes to roles and flow in the PCR process. Also updated names of approvers, CCB members, and management consistent with the NSLS-II facility organization. Reformatted consistent with updated Plan template.		August 11, 2016

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ACRONYMS

List all acronyms in the document, alphabetically. For example:

ALD	Associate Laboratory Director
BES	Office for Basic Energy Sciences
BHSO	Brookhaven Site Office
BNL	Brookhaven National Laboratory
CCB	Change Control Board
CMP	Configuration Management Plan
DOE	U.S. Department of Energy
DRA	Documents and Records Administrator
DRMP	Documents and Records Management Plan
ES&H	Environment, Safety, and Health
ESM	Electron SpectroMicroscopy
FXI	Full-field X-ray Imaging
GPL	Global Parameters List
GRD	Global Requirements Document
IPDv2	Integrated Project Database version 2
ISR	Integrated In-Situ and Resonant X-Ray Studies
ISS	Inner Shell Spectroscopy
MIE	Major Item of Equipment
NEXT	NSLS-II Experimental Tools
NSLS-II	National Synchrotron Light Source II
PCR	Project Change Request
PEP	Project Execution Plan
QA	Quality Assurance
RSI	Requirements, Specifications, and Interfaces
SIX	Soft Inelastic X-ray Scattering
SMI	Soft Matter Interfaces
TEC	Total Estimated Cost
TPC	Total Project Cost
WBS	Work Breakdown Structure

1 INTRODUCTION

1.1 General Overview

NSLS-II Experimental Tools (NEXT) is a U.S. Department of Energy (DOE) Major Item of Equipment (MIE) project that is being carried out to design and build five insertion device beamlines, and design a sixth, for NSLS-II, beyond the initial six NSLS-II Project beamlines. The *NEXT Project Execution Plan* (PEP) provides policy guidance for the overall planning and execution approach being used on the project and invokes this *NEXT Configuration Management Plan* (CMP) as the vehicle for maintaining the technical, cost, and schedule baselines for the beamlines. This CMP provides overall guidance on how the technical interfaces associated with the design, construction, and installation of the beamlines will be managed and maintained.

1.2 Design Authority

The NEXT Project Team is composed of six beamline groups: Electron SpectroMicroscopy (ESM), Full-field X-ray Imaging (FXI), Integrated In-Situ and Resonant X-Ray Studies (ISR), Inner Shell Spectroscopy (ISS), Soft Inelastic X-ray Scattering (SIX), and Soft Matter Interfaces (SMI). The overall design authority and responsibility for ensuring that the design of the beamlines meets critical operational and safety requirements associated with the project resides with the NEXT Project Manager. Each NEXT Level 2 manager has design authority and responsibility for the respective design activities associated with their beamline. The following table lists this design authority relationship for the respective components of the beamlines:

Beamline	Design Authority
Electron SpectroMicroscopy (ESM)	ESM Level 2 manager
Full-field X-ray Imaging (FXI)	FXI Level 2 manager
Integrated In-Situ and Resonant X-Ray Studies (ISR)	ISR Level 2 manager
Inner Shell Spectroscopy (ISS)	ISS Level 2 manager
Soft Inelastic X-ray Scattering (SIX)	SIX Level 2 manager
Soft Matter Interfaces (SMI)	SMI Level 2 manager

1.3 Project Organization Relationships

Each of the six NEXT beamline groups has expertise in its respective areas of design, construction, and installation of the beamline. To best utilize their capabilities, the project has established the greatest degree of freedom possible for the NEXT Level 2 managers to allow for independence and accountability in the design process within their own design authorities. This is being done to facilitate optimum performance by the respective groups and subsequent infusion of the highest level of expertise by the scientific community in the design of the beamlines. There are, however, interfaces between these areas which must be managed to assure integration across the project.

1.4 Interface Management Process

A comprehensive set of interfacing procedures have been developed to ensure that the respective elements of the beamlines and the facility interface, connect, and operate properly when they are installed at the site. These procedures provide a detailed technical description of the interfacing components of the beamlines and the facility. A list of these technical baseline documents is given in Section 2.3.

This set of interfacing documents, along with project management practices, establishes the means for coordination between the respective design entities. The procedures will allow the design and construction of the beamlines to proceed at an optimum cost and schedule.

2 ORGANIZATION AND APPROACH

2.1 Responsibility

The overall design authority for the project resides with the NEXT Project Manager. Implementation of design changes and responsibility for accuracy of the documentation for the beamlines resides with the NEXT Change Control Board (CCB) and the supporting technical organization. Selected administrative support functions are provided by the NEXT Configuration Manager and the NEXT Project Management Analyst. Table 2.1 lists the areas of responsibilities of the NEXT Configuration Manager and the NEXT Project Management Analyst.

Table 2.1 Configuration Management Responsibilities

NEXT Configuration Manager	NEXT Project Management Analyst
CCB Communication	Maintain Performance Measurement Baseline
Configuration Management Oversight	Contingency Status Reporting
Design Documentation Quality Management	Maintain Baseline Change Log
Document Number Allocation	Generate Cost and Schedule Change documentation
Document Master Index	Change Control Status Reporting
Document Storage	Change Control Number Allocation
Document Status Database	Change Control Document Processing
	Change Control Document Storage

2.2 Objectives

NEXT configuration management supports all NEXT functional groups in their configuration management/configuration control programs. The objectives of NEXT configuration management include the following:

- Ensure that integrity and continuity of changes are documented and recorded within the structure of technical, cost, and schedule baselines.
- Provide identification, control, and status reporting necessary to assist management in achieving timely system readiness, visibility, traceability, and field support.
- Provide managers at all levels with sufficient information for making appropriate, timely decisions throughout the life of the project.
- Ensure that the evaluation of proposed configuration changes is timely and includes a thorough consideration of the change’s total impact on technical, cost, schedule, operational capability, and support documentation.

2.3 Technical Baseline Documentation

To facilitate an integrated, high quality design for NEXT, the key design specifications and requirements for the NEXT systems and components are well defined and formally approved and maintained as controlled documents within a centrally available documentation database. These include the following documents.

- **NEXT Work Breakdown Structure (WBS) Dictionary** – The NEXT WBS Dictionary documents the technical baseline for the NEXT project and establishes the basis for all work to be performed. It is updated

as needed based on changes within the project scope or requirements responding to drivers external to the project. The NEXT Level 2 managers are responsible for maintaining the NEXT WBS Dictionary. The dictionary entries are prepared at a level (generally level 4) that is required to define the work to be done. Level 3, 2, and 1 summaries are also included. Only levels 1, 2, 3, and 4 are placed under configuration control. Lower levels (level 5 and below) may be prepared, but these are not controlled by the configuration management system.

- **Requirements, Specification and Interface Documents** – These documents provide a comprehensive description of the technical attributes and design basis for NEXT beamlines. They are the key design basis documents that provide the framework for how each beamline design will be developed. They include functional descriptions of major components broken down by WBS element and outline the design criteria. They also include a technical description of the design requirements for the associated component. They further establish the very detailed design basis criteria associated with the components, providing expanded design criteria and requirements details. Interface requirements regarding NSLS-II project systems are also provided to ensure that the framework for design integration is developed, scrutinized, and reviewed. These include both system-level technical interface requirements as well as design authority definitions that must be managed between the various NEXT and NSLS-II project participants.

The author of a key design requirement and/or specification for the NEXT project is responsible for maintaining his/her document. Design requirements and/or specifications that are no longer applicable will be considered “retired” and archived in the NEXT Documentation Database for historical purposes.

2.4 Cost Baseline

The cost baseline for the NEXT project is contained in the Cobra cost processor, as described in the *BNL Project Controls Manual*.

2.5 Schedule Baseline

The schedule baseline for the NEXT project is the detailed integrated project schedule in Primavera P6, as described in the *BNL Project Controls Manual*.

3 BASELINE CHANGE CONTROL MANAGEMENT

3.1 Configuration Management Plan

The NEXT CMP outlines the processes and procedures for managing the approved project baselines for the technical design basis, cost, schedule, and administrative changes. Management and control of the technical requirements and design parameters for NEXT involve critical issues and constitute the majority of coverage provided in the CMP. Management of the entire project technical baseline is the responsibility of the NEXT Project Manager. The CMP also delineates how the NEXT change control system will work to administer and record changes to the technical, cost, and schedule components of the project baseline.

3.2 Change Control Responsibility and Process

The Project Management Center (PMC) Group is responsible and accountable to the NEXT Project Manager for administrative operation and coordination of the overall baseline change control system in support of all NEXT project participants. The PMC NEXT Project Management Analyst and PMC Group Administrative Assistant provide administrative control and support for processing all NEXT Project Change Requests (PCRs). This process begins upon submission of draft PCRs and continues through various reviews to the final approval of the PCRs.

The NEXT Project Management Analyst is responsible for implementing approved cost and schedule baseline changes to the official NEXT project baseline documents and files.

The NEXT Level 2 managers are responsible for implementing all approved baseline technical/design basis changes to the official NEXT project technical baseline documents and supporting technical design documents.

Section 9 provides details concerning the processing, review, and approval of PCRs.

4. DESIGN REVIEW PROCESS

Design reviews will be conducted by either the NSLS-II Director, the NSLS-II Deputy for Construction, the NEXT Project Manager, or the NEXT Level 2 managers, depending on the scope of the review, and will be carried out for all major project systems, subsystems, and components. The reviews will provide for cross-discipline communication and ensure that the designs are functional, feasible, and meet the cost and operational objectives of the beamlines. Three levels of review should be considered: during the conceptual, preliminary, and final design phases, with increasing level of detail incorporated in the review process as the design progresses through its completion cycle. Depending on the design maturity level, a design review should consider the following elements:

- purpose of the review
- assumptions
- design requirements
- interface requirements
- design criteria
- description of the item
- engineering analysis
- reliability and maintenance
- hazards/safety analysis
- cost and schedule
- manufacturing/procurement plan
- installation plan
- documentation
- history
- previous action items
- Quality Assurance (QA) plan
- acceptance criteria (in the case of a final design review)
- bid package (in the case of a final design review)

Results of the reviews will be documented and archived as part of the design basis for the beamlines.

Depending on the nature of a proposed change, the responsible NEXT Level 2 manager may elect to use additional levels of design review to validate the change with the best available expertise. These additional levels of review could include interdisciplinary reviews, supervisory reviews, and management reviews.

5 PEER REVIEW PROCESS

To allow for the incorporation of developments and advancements in the scientific area of consideration, it is important to maintain an active program of interfacing with the scientific community. This will ensure that during the construction period of the project, advancements in technologies used on the project will be incorporated into the design of the beamlines.

The peer review meeting process is the approach used to facilitate infusing the expertise of the scientific community to review, evaluate, and consider beneficial alternatives to the design and construction of the beamlines. Some of the specific types of peer reviews facilitated within the NEXT Project are reviews by the Beamline Advisory Teams (BAT), the NSLS-II Project Advisory Committee, and the NSLS-II Scientific Advisory Committee. Typically, major changes would be subjected to peer review. This process is an important aspect of the project's development and is essential to ensuring that the project's design is current to today's standards. Endorsement by the scientific community further secures and establishes the integrity of the design and operation, following completion of construction activities.

6 QUALITY ASSURANCE PLAN

The *NEXT Quality Assurance Plan* provides overall quality requirements for the design and construction of the beamlines. This plan implements the ten criteria found in DOE Order 414.1C, *Quality Assurance*, covering the following aspects of the project:

- QA Program
- personnel training and qualification
- quality improvement
- documents and records
- work processes
- design
- procurement
- inspection and acceptance testing
- management assessment
- independent assessment

This CMP is established consistent with the *NEXT Quality Assurance Plan*. The plan requires identification of nonconforming conditions and deviations and requires them to be dispositioned before operation of the beamlines.

7 SYSTEM COMPLETION AND TURNOVER

The system completion and turnover milestone represents a significant aspect of the configuration management process. At this milestone, major aspects of operational integration and preoperational testing will be completed and documents required for operation will have been identified. Documentation packages, including test data, installation records, as-built drawings, quality control records, acceptance testing reports, and operation manuals, are provided to support commissioning of the system.

8 DOCUMENTATION AND RECORDS CONTROL

8.1 Records Management Process

The NEXT Configuration Manager is responsible for establishing the records management system, which will document configuration of the facility during construction and operational phases of the project. This system is administered by the NEXT Configuration Manager. The documentation must reflect the actual configuration of the beamline at the time of turnover for operation. Continued maintenance of this documentation is necessary to support the safe and reliable operation of the beamlines during and after commissioning.

The project will have the following requirements concerning maintenance of “as-built” documentation for the beamlines:

- Maintain integrity and consistency of design requirements, physical configuration, and project documentation throughout the life of the NEXT project.
- Provide for reconstitution of the NEXT project design capability at any stage in the life cycle of the project to meet environment, safety, and health (ES&H), maintenance, and operating requirements.
- Provide for material conditioning and aging management capabilities of NEXT physical structures and other equipment throughout the life of the project to meet ES&H, maintenance, and operating requirements.

The NEXT Project will establish a Document and Records Management Program to accomplish the preceding requirements. The procedures for creating, distributing and managing NEXT records and documents are similar to those in the BNL Site Records Management Program and are described in the [NSLS-II Process Description: Management of NSLS-II Documents](#). Procedures described in the DRMP provide instructions for unique numbering of documents and for handling controlled records. Procedures for the numbering and naming of drawings are described in the NSLS-II Design Room Standards document.

8.2 Document Review and Approval Process

Closely related to the records management process described previously is the documentation review and approval process. This is an electronic distribution vehicle used to disseminate technical information to the reviewing parties, allowing return comments via e-mail. Application of this process will allow for effective transmittal of complex technical information to a large group of people and accomplishes extensive reviews in a minimum amount of time.

9 BASELINE CHANGE CONTROL

9.1 Change Control Process

PCRs should be limited to those necessary to correct deficiencies, affect cost and/or schedule, significantly change technical scope and/or performance, and implement directed changes from the United States Government (Congress or DOE). A change request can be initiated by anyone associated with the project. The change process should begin only after the initiator has determined the anticipated technical, cost, and schedule impact of the change and discussed it with the appropriate Level 2 manager(s). Two possible courses of action exist: (1) a PCR for the recommended change is prepared and forwarded to the CCB for action, or (2) a request is prepared to perform a study to determine whether the baseline change is warranted. In the latter case, the process for approving the study resembles the change control process except that a Level 2 manager can authorize the study. Funding for the study will be obtained (1) from within existing budget allocations or (2) a PCR will be prepared to obtain the budget and funds. After the study is complete and it is determined that the change should be recommended, a PCR will be prepared and the review process implemented.

9.1.1 Technical Change Control Process

9.1.1.1 *Technical Change Review*

The proposed design changes will be decided upon following a technical change review within the appropriate Level 2 beamline group. In order to ensure effective communication is taking place, other Level 2 managers should participate, as should representatives from Project Management Analyst, ES&H, and Procurement when it is deemed necessary. This information should be documented and reflected in the submitted change proposal.

9.1.1.2 *Interface with the CCB*

The NEXT Project Manager will decide whether a change proposal needs to be submitted to the Change Control Board. This is the case if the change implies any use of contingency, if the schedule or the cost on any WBS element is affected by the change. Project Change Requests need to be submitted if certain controlled documents will be changed and if certain cost limits will be exceeded. Details are described in the Project Execution Plan (PEP). Even if there is no need to submit a project change request, all technical changes will be reported at the Project Monthly Status Meeting and the technical information of the change is made accessible to the rest of the project.

The change control process begins with the initiation of a PCR form. This form is shown in Appendix A. On this form, the initiator identifies the affected documentation; outlines the reasons for the change; quantifies the technical, cost, schedule, and administrative impacts; and describes the change in detail. The Level 2 manager must review and concur to the PCR before submittal.

The PCR form allows for review of all changes by the full NEXT CCB or the board's chair, including "out of scope" technical changes as well as cost and schedule changes. Both positive and negative changes will be addressed in the same manner.

Figure 9.1 provides a summary diagram of the NEXT project change control process. Figure 9.2 provides additional details concerning process steps, requirements, functions, and responsibilities. Table 9.1 identifies the baseline project documents which are maintained under configuration control.

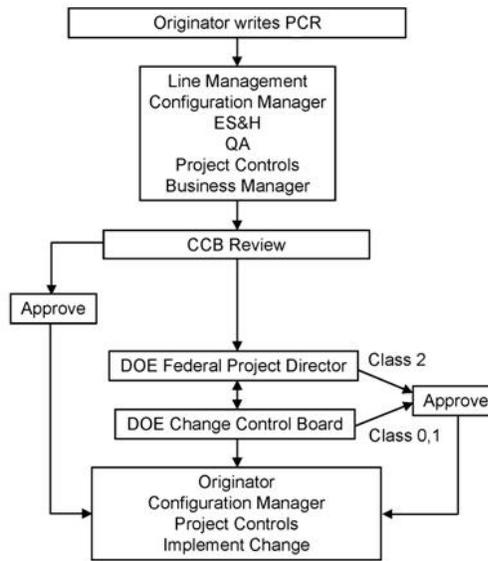


Figure 9.1 Change Control Process

9.1.2 PCR Processing

Numbers for PCRs will be assigned by the PMC Group Administrative Assistant. PCR numbering is as follows:

PCR_NEXT_YY_ZZZ

where

YY: Represents fiscal year abbreviation

ZZZ: Represents three-digit sequence number

Sequence numbers continue to increment and do not reset to zero at the beginning of a new fiscal year. For example, if PCRs begin being tracked in FY2012, then PCR_NEXT_12_001 would be the first PCR generated in that fiscal year. If thirty-eight PCRs are created in 2012, then the first PCR in 2013 would be PCR_NEXT_13_039. This numbering scheme indicates this PCR was the first to be generated in FY2013, but the thirty-ninth PCR generated in the life of the project.

Review of the PCRs is performed electronically, following the sequence shown in Figure 9.2. Once an electronic copy of the PCR is received by a NEXT CCB member, the member should thoroughly review the document content and direct any questions or concerns to the NEXT Project Management Analyst. Following review of the PCR, each CCB member either concurs with the content or identifies deficiencies that should be modified. In the latter case, the PCR is returned to the originator for possible modification, which then triggers the concurrence work flow. In the former case, following concurrence of all staff shown on Figure 9.2, the PCR is forwarded to the CCB, as a group, for approval or disapproval. In the case of disapproval, the PCR is returned to the originator for possible modification and restart of the approval process. The PCR is also recorded as “disapproved” in IPDv2. If modification is not restarted, the process for this PCR ends. In the case of approval, the PCR is recorded as “approved” in IPDv2 and is transmitted to the originator for implementation.

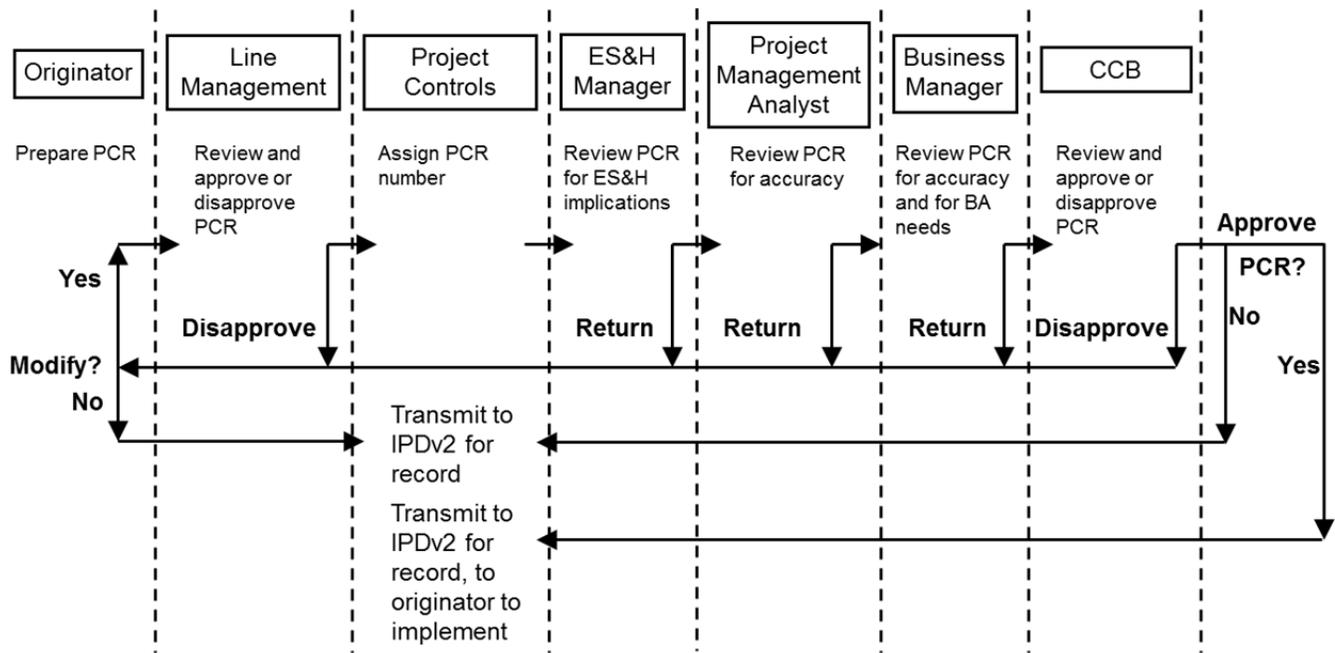


Figure 9.2 Change Control Flow

Table 9.1 Baseline Documents¹ under Configuration Control

- NEXT Project Execution Plan
- NEXT Environmental, Safety, & Health Plan
- NEXT Preliminary and Final Hazard Analysis
- NEXT Quality Assurance Plan
- NEXT Risk Management Plan
- NEXT Configuration Management Plan
- NEXT Project Assumptions Document
- WBS
- WBS Dictionary
- Requirements, Specifications, and Interface Documents
- Drawings and Specifications
- Approved Project Change Requests (PCRs)

¹A document becomes a part of the NEXT baseline only after approval by the cognizant authority.

9.1.2.1 Two-Phased PCR Approval Process

When a PCR that involves cost or schedule “uncertainties” is being generated, it may be processed and approved in a two-phased approach to facilitate timely approvals for major decisions and also allow project staff to begin working on their detailed plans without delay. The two-phased approach allows for initial approval based on a rough estimate generated by the CAM with assistance from Project Management Analyst, followed later by thorough implementation details prepared as an Implementation Appendix by Project Management Analyst. A checkbox below the Level of Change in Section A of the PCR form indicates that an Implementation Appendix will be part of the complete PCR package. Implementation of the two-phased approval process should be limited and used on an exception basis, when the specific details of the cost/schedule change are not known and there is a project related urgency requiring immediate approval.

During Phase One, a major cost/schedule PCR is generated with a rough cost estimate using the Project Management Analyst cost estimating tool and schedule impact assessment provided by the CAM. The PCR will be subsequently approved by the appropriate authority after concurrence from the Change Control Board.

During Phase Two, Project Management Analyst will enter the cost and schedule change in Cobra and Primavera and generate a report showing the impact of the change to the cost and schedule baseline. The time required for completion of this activity will be approximately 2 to 3 weeks, depending on the complexity of the change request. The cost estimate must be within 10 percent of the original estimate or below \$25K—whichever is least.

Once the detailed cost and schedule impact reports are generated, an Implementation Appendix form will be prepared, the change will be implemented in Primavera and Cobra and the cost and schedule reports will be attached to the PCR as proof of implementation. This form and the associated reports will be submitted by Project Controls with concurrence from the affected Level 2 manager.

If final implementation details fall outside of the above 10% and \$25K criteria, a revised PCR will be generated to incorporate the more accurate data and re-routed through the approval cycle with the final numbers. This revised PCR will require the same concurrence and approval process as the original PCR. Concurrence and approval will be captured on the PCR Implementation Appendix.

9.1.3 Engineering Change Requests

Any project team member recognizing the need for modifying a drawing or specification may take such action through the Engineering Change Request/Notice (ECR/ECN) process. The procedure, *Preparing and Revising Drawings and Specifications*, which is posted on the Quality Assurance SharePoint group site, outlines the process steps for creating such changes.

9.1.4 Change Control Board

The NEXT configuration management and control processes use a graded approach, employing change criteria for cost, schedule, and technical baseline information. Changes with greater potential for impact require higher approval authority.

The NEXT CCB is composed of a chair, permanent members, and advisors. The Charter and membership of the CCB are given in Appendix C.

The NEXT Configuration Manager (or designee) shall serve as the secretariat for the CCB, ensure that the change control process is managed per the Configuration Management Plan, and prepare and maintain records of all CCB actions.

The PMC Project Analyst, with support from the PMC Group Administrative Assistant, will:

1. Compile the Change Control Documentation
2. Distribute copies of the PCR and supporting documentation to the CCB members for review and comment.
3. Track all project changes and publish project-wide change control reports.
4. Maintain a log of all PCR packages with financial and/or schedule impacts in IPDv2.

9.1.5 Levels of Change

Changes are classified according to the authority level required to approve the requested change. Table 9.2 specifies the change thresholds for the change levels described subsequently. The highest change control level that applies to any of the three categories (scope, cost, and schedule) is to be applied for a requested change. That is, if the proposed change causes the Level 1 cost threshold to be exceeded, a Level 2 scope threshold to be exceeded, and a Level 3 schedule threshold to be exceeded, the change is a Level 1 change.

In case of conflict between Table 9.2 and the NEXT PEP, the order of precedence shall be the NEXT PEP, then the NEXT Configuration Management Plan.

9.1.5.1 Level 0 Change

There are no Level 0 thresholds for changes within the performance baseline. Level 0 changes are deviations from the performance baseline, and require the approval of the DOE Deputy Director for Science. Cost, schedule, and scope thresholds for deviations are defined in the NEXT PEP and listed in Table 9.2. Level 0 changes must have concurrence from the NEXT Project Manager and from the NSLS-II Director and the NSLS-II Deputy for Construction before being submitted to DOE.

9.1.5.2 Level 1 Change

Level 1 changes require approval of the Associate Director of the DOE Office of Basic Energy Sciences (BES). Cost, schedule, and technical thresholds for this class of change are defined in the NEXT PEP and are also listed in Table 9.2. Level 1 changes must have concurrence from the NEXT Project Manager, from the NSLS-II Deputy for Construction, and from the NSLS-II Director before being submitted to DOE.

Table 9.2 Configuration Management Change Thresholds

	Performance Baseline Deviation	Routine Project Changes			
	Level 0	Level 1	Level 2	Level 3	Level 4
	Deputy Director for Science	Acq. Executive (AD for OBES)	DOE Federal Project Director*	NEXT Project Manager	NEXT Project Manager
Scope	Any change in scope and/or performance that affects the ability to satisfy the mission need or is not in conformance with the current Congressional budget request.	Any change affecting the NEXT project KPPs as defined in PEP Section 2.1.	Major changes affecting the NEXT project technology or approach to Level 2 WBS components as shown in PEP Table 2.5.	Major changes to WBS below Level 2.	Reportable changes which do not impact the NEXT WBS Dictionary and have no impact beyond the boundaries of the respective design authority of the WBS Level 2 Manager making the change.
Cost	Any increase in the TPC as shown in PEP Table 2.2.	Any increase in the baseline TEC or OPC as shown in PEP Table 2.6.	Cumulative change of ≥ \$5M in the performance measurement baseline.**	Cumulative change of ≥ \$200K but < \$5M in the performance measurement baseline.**	Cumulative change of ≥ \$25K but < \$200K in the performance measurement baseline.**
Schedule	Any delay in the original CD-4 date.	Any delay in Level 1 schedule milestone with the exception of CD-4 > 1 quarter as shown in PEP Table 2.3.	Delay in a Level 2 schedule milestone > 1 quarter as shown in PEP Table 2.4.	Delay in a Level 3 schedule milestone > 1 quarter as shown in PEP Table 2.5.	Reportable delays which do not impact any Level 3 milestones.
Funding		Any change to funding profile as shown in PEP Section 2.5 that negatively impacts the performance measurement baseline.			
Administrative					Reportable changes not falling into the categories above, including CAM changes, variance threshold changes, minor corrections to WBS Dictionary not impacting scope, and changes to tracking of procurements

* Any contingency usage will require approval by the FPD or Federal personnel.

** After the cumulative threshold has been reached and the next higher change authority has been notified and has approved the changes, the cumulative cost thresholds will reset.

*** The Federal Project Director, with the concurrence of the Associate Director, Office of Basic Energy Sciences, may assign a portion of the contingency to the NEXT Project Manager to add to management reserve.

9.1.5.3 Level 2 Change

Level 2 changes require approval of the DOE Brookhaven Site Office (BHSO) NEXT Federal Project Director. Cost, schedule, and technical thresholds for this class of change are defined in the NEXT PEP and are also listed in Table 9.2. Level 2 changes must have concurrence from the NEXT Project Manager before being submitted to DOE.

9.1.5.4 Level 3 Change

Level 3 changes require approval of the NEXT Project Manager. Cost, schedule, and technical thresholds for this level of change are defined in the NEXT PEP document and are also listed in Table 9.2.

9.1.5.5 Level 4 Change

Level 4 changes require approval of the NEXT Project Manager. Cost, schedule, and technical thresholds for this level of change are listed in Table 9.2.

9.2 Changes that Require DOE Approval

If a change requires DOE approval, Section C of the PCR form must be completed by the Project Controls Group.

9.3 Technical Changes Not Impacting Cost and Schedule Baselines

Minor technical changes may be implemented under the authority of the Level 2 managers and do not require a PCR if they do not impact the *NEXT WBS Dictionary*, do not impact the cost and schedule baselines, and have no impact beyond the boundaries of the respective design authority of the Level 2 manager making the change.

The Level 2 managers are responsible for revision and approval, including creation of new documentation, of the technical baseline documents under their purview that are not covered by the processes described in this CMP. This will pertain to documentation received from vendors, or prepared in-house (drawings, data sheets, specifications, operating procedures, etc.). This will include documentation of the as-built condition of the beamlines and also provide the initial technical baseline for operations. After approval and submission to the NEXT Configuration Manager (or designee), these documents will be managed in accordance with Section 8, Documentation and Records Control.

10 CONTINGENCY

10.1 General

In establishing the NEXT baseline, the basis of the estimate was documented in the NEXT cost estimate database and included the estimated budget at completion, and a bottom-up contingency estimate for each WBS element of the project. The estimated contingency considered cost, schedule, and technical risks and uncertainties that exist in the project elements.

Management of cost, schedule, and technical risks is integral to contingency management. NEXT project management evaluates project risk issues on a continuing basis. Various meetings and/or approaches are used for identifying project risks and discussing/tracking mitigation strategies. The project also conducts regular risk assessments. The project's risk assessment process is fully described in the *NEXT Risk Management Plan*.

10.2 Contingency Management Process

Requirements:

1. Contingency is managed as a central fund by the NEXT Federal Project Director. All use of contingency must be traceable through the PCR process so that the history of contingency applications can be fully ascertained. The NEXT Project Controls Specialist is responsible for maintaining these records using contingency/management reserve log.
2. Contingency estimates are included within the project's TEC and are considered part of that cost.
3. Contingency funds are intended to cover the existing scope of the project's technical baseline.

Figure 10.1 provides an overview of this process.

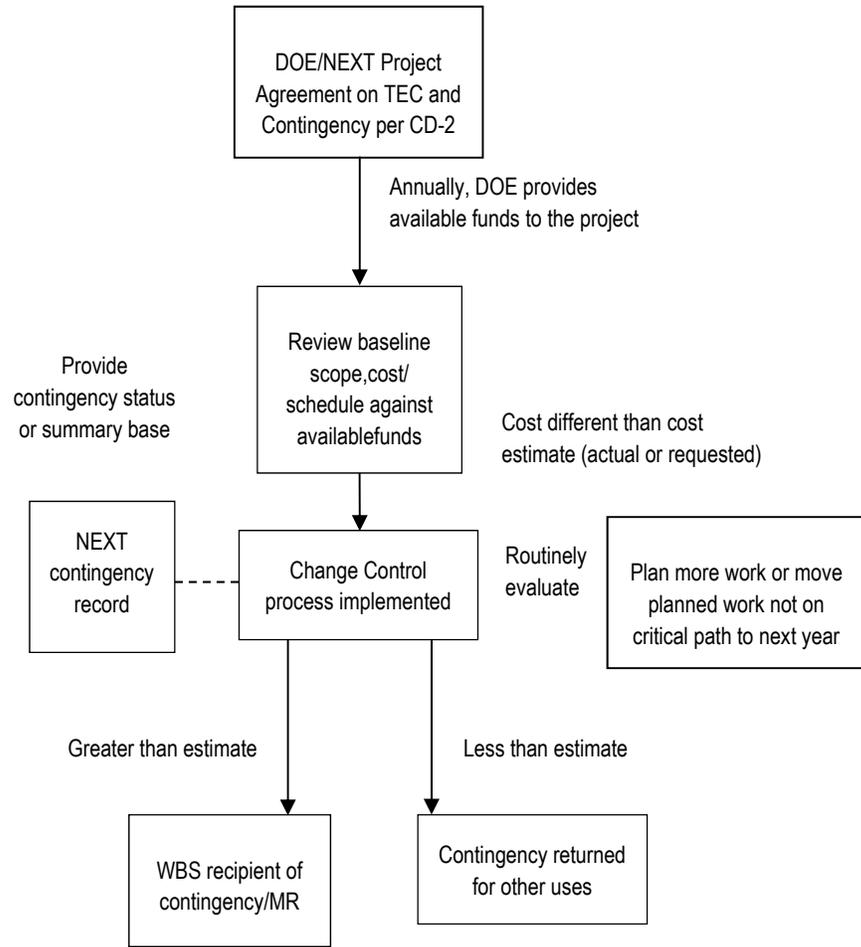


Figure 10.1 Contingency Control Process

11. MANAGEMENT RESERVE

11.1 Purpose

Management Reserve (MR) budget covers costs unforeseen, but within the DOE approved scope-of-work. The MR budget is managed by the BSA/BNL NEXT Project Manager. The NEXT Project Manager submits a Project Change Request (PCR) to the NEXT Federal Project Director, requesting the allocation of project contingency budget to the Management Reserve budget. Use of Management Reserve will be controlled and documented, using the Change Control process, and logged into the Project Change Control Log.

11.2 Process

- The NEXT Level 2 manager identifies a need for a change to scope, cost, or schedule within their beamline WBS element.
- The NEXT Level 2 manager generates a PCR to the NEXT Project Manager and copies to Project Controls for review and submittal for approval of the use of Management Reserve.
- The PCR request should include the following information:
 - purpose of the request
 - amount of request
 - WBS element(s) impacted
 - whether urgent processing is necessary
 - date when funds are required
 - cost estimate and schedule impact
- The PCR is then routed to the NEXT Configuration Manager for processing and CCB approval. Once approved, the PCR is implemented by NEXT Project Controls Specialist.
- Authorization is logged within the NEXT Management Reserve Allocation Log.

11.3 Tracking and Posting

Changes that require the use of MR are logged into the NEXT Management Reserve Allocation Log. When several cumulative changes within each beamline level 2 WBS element trip the \$ threshold specified in the “Project Variance Thresholds for the NSLS-II Experimental Tools (NEXT) Project” (NX-C-PRJ-PLN-007), the NEXT Level 2 manager must submit a PCR to document these cumulative changes. Once this PCR has been approved and processed, the threshold tracking will be reset to zero.

11.3.1 Components of NEXT Management Reserve Allocation Log

The NEXT Management Reserve Allocation Log is comprised of the following components:

WBS number

WBS description

reason for MR allocation

individual beamline usage columns

individual beamline cumulative total

usage approval date

11.3.2 Posting Location

The NEXT Management Reserve Allocation Log is posted on the SharePoint Project Management Group site.

Attachment A. NEXT PCR Form

Sample NEXT PCR (Process Change Request) Form, without header (p. 1 of 4)

Instructions: 1. Provide detailed attachments as appropriate and check the box to indicate a document is attached.

Section A

Origination (ddMonyy) (type in expandable field) WBS No(s) Type of change (Check all that apply; give details in Section B.) Technical <input type="checkbox"/> Schedule <input type="checkbox"/> Cost <input type="checkbox"/> Administrative <input type="checkbox"/> Use of management reserve? Y <input type="checkbox"/> N <input type="checkbox"/> Use of contingency funds? Y <input type="checkbox"/> N <input type="checkbox"/>	PCR title: Directed change? Y <input type="checkbox"/> Brief reason for change: Level of change (Level affects signatures needed in Concurrence section.) 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/> 1 <input type="checkbox"/> 0 <input type="checkbox"/> Project Levels -----DOE Levels ----- If this PCR requires a phased implementation, check here. <input type="checkbox"/>
--	---

Section B

Summary of change:	Attachments? Y <input type="checkbox"/>
Technical change Description (include interfaces with other elements)	Attachments? Y <input type="checkbox"/>
Detailed cost estimate with basis for estimate Description with basis	Total change in \$K Attachments? Y <input type="checkbox"/>
Cost baseline impact Orig. cost, \$K Est. revised, \$K Est. change, \$K	
Final budgeted cost, \$K	
Description	Attachments? Y <input type="checkbox"/> EAC or Risk ID #
Schedule impact	Attachments? Y <input type="checkbox"/>
Administrative impact Labor costs <input type="checkbox"/> Material costs <input type="checkbox"/> Changes WBS dictionary? Y <input type="checkbox"/> N <input type="checkbox"/> if Y, highest WBS level affected: 4 <input type="checkbox"/> 3 <input type="checkbox"/> 2 <input type="checkbox"/>	
Major(>\$100K) procurement <input type="checkbox"/> Description	Documentation update required? Y <input type="checkbox"/> N <input type="checkbox"/> Attachments? Y <input type="checkbox"/>

Section C (use only if management reserve funds are involved, or for DOE-level changes: Levels 2, 1, and 0)

Funding source and impacts on funding and contracts Res.(\$K)	Contingency (\$K)		Mgmt.
	Before:	\$	\$
	This requisition:	\$	\$
	New net:	\$	\$

Funding spread (BA) by FY	FY12	FY13	FY14	FY15	FY16	FY17	TOTAL

Cost Baseline in \$K	FY12	FY13	FY14	FY15	FY16	FY17	TOTAL
Baseline Proposed Change (BCWS)							
Management Reserve / Contingency							

Total Project Cost (TPC) in \$K	Baseline DOE PCR	Change	Proposed Baseline PCR
WBS 2.1 Project Management			
WBS 2.3 Common Beamline Systems			
WBS 2.4 Control System			
WBS 2.5 ESM Beamline			
WBS 2.6 FXI Beamline			
WBS 2.7 ISR Beamline			
WBS 2.8 ISS Beamline			
WBS 2.9 SIX Beamline			
WBS 2.10 SMI Beamline			
WBS 2.11 Insertion Devices			
Management Reserve			
Total Estimated Cost (TEC) Contingency			
Total Estimated Cost			
WBS 2.2 Conceptual Design			
Other Project Costs (OPC) Contingency			
Total OPC			
Total Project Costs (TPC)			

Concurrence and approvals

The originator's name should be typed in the space provided (27-character limit).

A Level 4 PCR needs 2 concurrences (NEXT Level 2 Manager and NEXT Project Controls Specialist), and approval from the NEXT Project Manager.

A Level 3 PCR needs concurrences from the NEXT Level 2 Manager, NEXT Quality Assurance/CM Manager, NEXT Senior Business Operations Specialist, NEXT Project Management Analyst, and NEXT ESH Manager and approval from the NEXT Project Manager.

A Level 2 PCR needs concurrences for a Level 3 PCR plus concurrence from the NSLS-II Deputy for Construction and approval from the NEXT Federal Project Director.

Levels 1 and 0 require DOE HQ approval from the official(s) named below the dotted line, and concurrence from all preceding reviewers.

Originator	_____
NEXT Level 2 Manager	_____
NEXT Quality Assurance/CM Manager	Joseph Zipper
NEXT Senior Business Operations Specialist	Heather Turbush
NEXT Project Management Analyst	Jenn O'Connor
NEXT ESH Manager	Lori Stiegler
NEXT Project Manager	Steve Hulbert
NSLS-II Deputy for Construction	Erik Johnson
NEXT Federal Project Director	Robert Caradonna

Signatures are on file after approval is completed within the Configuration Management Integrated Project Data (IPD) site.

DOE HQ-Level Approval (only for Level 1 and 0 PCRs, from the official indicated for that level; & concurrence from all preceding reviewers)

Official's typed name

Signature

Date (ddMonyy)

Level 1

DOE/SC CCB Action _____
Associate Director, DOE Office of Basic Energy Science

Level 0

DOE ESAAB CCB Action _____
Deputy Director for Science

Use this page only if a phased implementation is involved. If not, this page may be deleted.

NEXT PCR Implementation Appendix

Instructions: The Project Controls group will provide necessary implementation details, then obtain signatures.

PCR_NEXT_ (complete number in yy_nnn format)

Appendix preparation date:

Implementation details:

Signatures

	Title	Name	Signature	Date
Submitted by:	NEXT Project Management Analyst	_____	_____	_____
Concurrence:	NEXT CAM	_____	_____	_____
Approved by:	NEXT Level 2 Manager	_____	_____	_____

Attachment B. Definitions

Change Control Board (CCB) – multidisciplinary body of representatives, appointed by the appropriate management level, responsible for ensuring the proper definition, coordination, evaluation, and disposition of all changes to project baselines within their chartered jurisdiction.

Contingency – amount budgeted to cover costs that may result from incomplete design, unforeseen or unpredictable conditions, and uncertainties. The amount of the contingency will depend on the status of design, procurement, and construction and the complexity and uncertainty of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected cost.

Directed changes – technical, cost, and schedule baselines may be subject to change because of DOE Headquarter’s decisions or annual funding restraints. In the event that an external driver results in a change to the project’s planned approach, DOE will direct that a *PRIORITY PCR* be generated that defines requirements and impacts on cost, schedule, or technical parameters. The changes are mandatory and are generally processed by the Level 2 approval authority within ten working days.

Emergency changes – changes that have potentially immediate impacts and are *URGENT PCRs*. These PCRs are generally processed within one day. The NEXT Project Manager determines the applicability of an urgent PCR and alerts the NEXT Federal Project Director that an urgent change is necessary to prevent a catastrophic situation from developing.

Project Change Request (PCR) – form prepared to request a technical, cost, or schedule change at threshold levels for approval by CCB.

Scope – incorporates performance and design requirements, criteria, and characteristics derived from mission needs that provide the basis for project direction and execution.

Thresholds – limits of authority at each respective change control level for approval of proposed baseline changes and controls.

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Attachment C. NEXT Change Control Board Charter

I. Charge

The NEXT Change Control Board (CCB) shall develop and document an organized, comprehensive, and active strategy, as well as methods, for ensuring that project changes are identified, evaluated, coordinated and controlled, reviewed, approved or disapproved, incorporated, tested, and documented. The CCB will follow the processes described in this NEXT Configuration Management Plan to ensure a successful change management program. The CCB will include a chair, a secretariat, regular members, and ex officio members. The board chair is ultimately responsible for any change decision, and as such, is the one person with approval authority. Members (both regular and ex officio) sit on the board to individually and collectively assist and advise the chair on technical, quality and reliability, financial, schedule, and environmental, safety, and health (ES&H) matters.

II. Membership

- a. Appointed by: NEXT Project Manager
- b. Members:

S. Hulbert (Chair)	NEXT Project Manager
C. Herbst (Secretariat)	PMC Group Administrative Assistant
J. Zipper	NEXT Quality Assurance/Configuration Manager
L. Stiegler	NEXT ES&H Manager
J. O'Connor	NEXT Project Management Analyst
H. Turbush	NEXT Senior Business Operations Specialist
E. Johnson (ex officio)	NSLS-II Deputy for Construction
P. Zschack (ex officio)	NSLS-II Photon Science Division Director
J. Hill (ex officio)	NSLS-II Director
F. Crescenzo (ex officio)	NSLS-II Federal Project Director (SC-BHSO)
R. Caradonna (ex officio)	NEXT Federal Project Director (SC-BHSO)

[If you have any questions or feedback regarding this document, please click this link.](#)