Change Control Process

Ranpal Gill, Robert McKercher, George Angeli, Chuck Claver and Ruth Kneale

LPM-19 (rel6.2)

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# Change Control Process

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<tr>
<td>2</td>
<td>6/19/2011</td>
<td>General Updates for NSF PDR</td>
<td>Victor Krabbendam</td>
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<td>3</td>
<td>2/6/2013</td>
<td>Initial draft of a wholesale change to reflect recently adopted changes to change control processes and procedures. The changes simplify and streamline the process and provide a procedure document that is more clear and concise.</td>
<td>George Angeli</td>
</tr>
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<td>3.1</td>
<td>2/10/2013</td>
<td>Incorporated comments from C. Claver and Brian Selvy</td>
<td>G. Angeli</td>
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<td>3.2</td>
<td>2/15/2013</td>
<td>Additional comments incorporated</td>
<td>G. Angeli</td>
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<td>3.3</td>
<td>2/23/2013</td>
<td>Process clarified</td>
<td>G. Angeli</td>
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<td>2/24/2013</td>
<td>Section 5 added and document formatted to project standard</td>
<td>R. McKercher</td>
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<td>3.5</td>
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<td>Added Section 4.1 describing the web-based workflow.</td>
<td>R. McKercher</td>
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<td>S. Kahn</td>
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<td>3.9</td>
<td>9/30/2013</td>
<td>Inter-document consistency fixes, formatting and typo corrections. No content changed. Changes approved via LCR-154</td>
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<td>10/4/2013</td>
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| 4   | 12/10/2015 | Updated to include formal descriptions of processes and procedures already being followed. Improved grammar, syntax and clarified descriptions throughout. Substantive changes are: a) added subsystem chief engineers to CCB membership; b) streamlined workflow diagram and updated it to include “PMCS-related” and “Approval Pending NSF branches;” c) added Section 3.1 Types of Change Request Submissions to formally acknowledge deviation requests and information items; d) divided Section 4 into "Voting Issues Workflow" and "Information Items Workflow" and added descriptions of PMCS-related workflow for both voting issues and information items; e) added Section 5: Voting with explanation that voting may be done at any time, defining three vote options, and explaining that not voting at all will be assumed to be "No Objection;" f) in Section 6 Change Control Board Meetings (was Section 5), added third Wednesday of the month as regularly scheduled meeting date and added expectation that Chair will advertise | R. McKercher |

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<tr>
<td>2018/10/10</td>
<td>Implementation of LCR-1473, Member names included in confluence: <a href="https://confluence.lsstcorp.org/display/LSSTPO/CCB+Membership">https://confluence.lsstcorp.org/display/LSSTPO/CCB+Membership</a></td>
<td>R. Gill</td>
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<tr>
<td>2019-08-01</td>
<td>Added ETC process. More specificity regarding the DOE Commissioning PMCS-related workflow.</td>
<td>R. McKercher</td>
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<tr>
<td>6.0</td>
<td>Implementation of LCR-1954, which approved the changes in the line above. Change record entry above for LCR-1473 implementation should have been release 5.0.</td>
<td>R. McKercher</td>
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<tr>
<td>6.1</td>
<td>URL fix in Section 4 – old CCB System URL was stated, updated to <a href="https://project.lsst.org/groups/ccb/">https://project.lsst.org/groups/ccb/</a></td>
<td>R. Gill</td>
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<td>6.2</td>
<td>Added <strong>Section 3.1.2.2 Summit-Approved Procedures.</strong> Updated to Rubin Observatory document template; enacted name change to Rubin throughout.</td>
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<td>2021-04-28</td>
<td>Implementation of LCR-2704, which approved the changes described in the previous row</td>
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Change Control Process

Summary

The Vera C. Rubin Observatory (Rubin Observatory) Change Control Process enumerates the rigorous methodology used by the project to establish and maintain project baselines (technical, cost, and schedule) in a way that ensures transparency and broad project representation in the consistent management of the system configuration. This policy applies to Project Office and Project Systems Engineering configuration items. The process is also used to review the activities of the subsystem’s configuration control to ensure project level concurrence with low level changes and to promote transparency within the Project.

A key element of the Change Control Process is the Change Control Board (CCB). The CCB has broad project representation and has the responsibility to process all changes and recommend the appropriate action. The recommendation is provided to the Rubin Project Manager who is responsible for managing the Project planning to accommodate the changes. Working within the delegated authorities, the Project Manager is responsible to work with the subsystem managers, the appropriate contracts departments, and when Department of Energy (DOE) camera costs, schedule and scope are affected, with the SLAC Camera Project Manager to develop plans. All actions are reported to, and approved by the Rubin Director, and all actions will follow the authorities defined within the Rubin Project Execution Plan and the DOE LSST Camera Project Execution Plan.

Definitions of Terms

https://www.lsst.org/scientists/glossary-acronyms

References

Change Control Website (https://project.lsst.org/groups/ccb/)

“DocuShare Release Process for Summit-Approved Documents” (LCA-18981)

“EVMS System Description” (LPM-98)

“LSST Camera Project Execution Plan” (LCA-225)

“Project Execution Plan” (LPM-54)
1 Introduction

The primary objective of the Vera C. Rubin Observatory (Rubin Observatory) Change Control Process is to establish and maintain project technical, cost, and schedule baselines through a rigorous methodology that ensures transparency and broad project representation in the consistent management of the system configuration. This policy applies to Rubin Project Office and Project Systems Engineering configuration items. The process is also used to review the activities of the subsystems’ configuration control to ensure project level concurrence with low level changes and to promote transparency within the Project.

The Rubin technical configuration consists of system and subsystem requirements, interface control documents, selected design documentation, drawings and design models and software. This configuration information is archived in four electronic databases, depending on their nature: (i) DocuShare, (ii) shop drawing and solid model database (PDMWorks), (iii) software version control, and (iv) project management controls system (PMCS). The Rubin Project Manager and Systems Engineering Manager specify the subset of configuration material to place under formal control. The project cost and schedule baselines and project guidelines and procedures are also maintained centrally and subject to the change control process.

The Subsystem Managers can make changes to their subsystems up to their delegated authority level, unless a particular change affects system level controlled information, including subsystem requirements and interfaces between subsystems. The Subsystem Managers may set up subsystem change control boards to advise their decisions. Changes
made by the Subsystem Managers are regularly reported to the project Change Control
Board.

Project controlled documents may not be changed without proper processing through the
change control workflow. Project controlled documents have specific handle designations for
common and immediate recognition. Software and model control status is managed within
the specific management tools but changes are still processed through this policy.

2 Change Control Board (CCB)

The Change Control Board (CCB) is an advisory body to the Rubin Director and the Project
Manager. The Project Manager is responsible for further disposition of (approve, reject, or
promote) a change request (LCR). The Project Manager will act within her/his decision
authority level and promote to higher levels any change outside her/his authority.
Specifically, the Project Manager is responsible to work with the subsystem managers, the
appropriate contracts departments, and when DOE camera costs, schedule, and scope are
affected, with the SLAC Camera Project Manager to develop plans. All actions are reported to,
and approved by the Rubin Director, and all actions will follow the authorities defined within
the Rubin “Project Execution Plan” (LPM-54) and the DOE “LSST Camera Project Execution
Plan” (LCA-225).

Members of the CCB are expected to offer comments and recommendations regarding the
change requests discussed. The comments and recommendations may be provided in writing
before or after the meeting in a well-defined time period, or verbally during the meeting.

The Change Control Board includes:

- A Senior Manager (Chair – non-voting)
• Project Manager (votes through process)
• Project Scientist
• Head of Safety
• Business Office

Also comprised of one representative of each of the following:

• Systems Engineering (SE)
• Commissioning
• Data Management (DM)
• Camera
• Telescope and Site (T&S)
• Education and Public Outreach (EPO)
• Operations

Specific roles required to vote on DOE Commissioning PMCS LCRs are:

• DOE Scientist/Deputy
• Commissioning Manager
• DOE Project Management Controls System (PMCS) Specialist
• NSF PMCS Specialist
• DOE Camera Project Manager
• DOE Camera Subsystem Scientist
• Rubin Project Manager

Specific roles required to vote on ETC LCRs, as they apply to the relevant subsystem, are:

• DM Subsystem Manager
• EPO Subsystem Manager
• SE Subsystem Manager
• TS Subsystem Manager

The Director, Deputy Director, Chief Scientist, and Project Manager are included in all CCB
communication and invited to participate in any CCB meeting.

3 The Process

The change control process is uniform for technical, budget and schedule changes, as well as for any combination of these. Every change control action starts with the submission of a Change Request (LCR) form to the CCB Chair, declaring the need for change, as well as the initial expected consequences of the change. The LCR serves as the single ticket for this change; it documents the process by capturing the notes, impact analysis and decisions associated with the change.

An LCR needs to be initiated

- To establish controlled documentation defining the baseline requirements, interfaces, design, budget and schedule of the project and the subsystems (T&S, Camera, DM, as well as EPO), and
- To change the established, controlled documentation.

The version/revision control processes for the drawing and solid model database and software version control can initiate a formal change control request, if the new version violates formally controlled information (“form, fit, or function” in system or subsystem requirements, interfaces between subsystems, or controlled design). In these cases, the LCR can accompany the version submission, or can be requested by Systems Engineering, based on its analysis during the version update process.

Each request is uploaded to the project archive, DocuShare, in a separate collection with all the necessary supporting documents. As the request matures, its entire collection is moved through the appropriate DocuShare collections: “Proposed,” “Studied,” “Pending,” “Approval
Pending,” and “Approved” or “Rejected.”

**Figure 1** on the following page shows the change control process as a flowchart.
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3.1 Types of Change Request Submissions

3.1.1 Voting Issue

Proposals upon which CCB members are expected to vote. Examples of voting issues might be (i) replacing Interface Control Document (ICD) TBDs with real specifications or (ii) adding new requirements to the Observatory System Specifications (OSS, LSE-30). Two specialized examples are discussed in more detail in the following subsections.

3.1.1.1 Deviation Request

A subset of voting issues, these are requests for authorization to depart from an established requirement or specification, rather than a request to change said requirement or specification, prior to creation of a configuration item. An example might be a request to depart from a specification in order to allow a vendor to use an alternative technical solution with equivalent performance but increased manufacturability.

3.1.1.2 DOE Commissioning PMCS-Related

A subset of voting issues, these are requests to change the project plan in way(s) that also will affect the DOE Camera Commissioning project. To be approved and implemented, these requests require recommendation votes from all members of the DOE Commissioning voting subset as identified in Section 2.

3.1.2 Information Item

Any proposal where the Project Manager has decided NOT to ask the CCB for a recommendation. While the Project Manager has the authority to make cost, schedule and technical changes without requesting a CCB vote, information items follow the change
control process for transparency and in order to maintain a record of the change and its justification. Examples of information items might be (i) a change to the PMCS project plan directed by the NSF or (ii) a project-level policy change that has no impact on cost, schedule, or technical requirements. A specialized example is discussed in more detail in the following subsection.

3.1.2.1 ETC Request

A subset of information item, these requests propose a change to the MREFC project plan’s baseline Estimate to Complete (ETC). The ETC is the latest revised estimate for the remaining work scope; it is the amount of money required to complete the remaining work from the period status date. ETC requests require approval by the relevant subsystem manager and the Rubin Project Manager.

More detail regarding the ETC process can be found in the “EVMS System Description” (LPM-98).

3.1.2.2 Summit-Approved Procedures

A subset of information item, these requests propose approval of or change to a critical LSSTCam procedure to be used at the Summit Facility. The procedure(s) is proposed as both an LCR and a Change Notice (LCN). The document creator generates an LCN, and the Camera Configuration Manager (CM) submits the LCR. The LCN and LCR are cross-referenced to each other. Procedure review and approval occurs via the DocuShare routing functionality. The LCR is administered as a non-voting item and serves as the Rubin change control record for the LCN approval. The full process is described in detail in “DocuShare Release Process for Summit-Approved Documents” (LCA-18981).
3.2 Process Phases

3.2.1 Proposal Phase

If the proposed change is not valid – for example it proposes a change to a document not under formal change control – the CCB Chair can reject the change request at submission. Also in this phase, the CCB Chair can request additional information and/or revisions from the Originator.

The objective is to prepare the LCR for project-wide distribution and analysis.

In the case where the Change Request impacts the DOE Commissioning PMCS, this is indicated when the LCR is submitted. This will trigger generation of a DOE Baseline Change Request (BCR).

3.2.2 Analysis Phase

The CCB is officially notified about the request. Project Systems Engineering, with the active support of the subsystem teams led by their respective CCB members, initiates and manages impact studies. Optionally, a draft(s) of the affected document(s) is prepared with the proposed changes incorporated.

The objective is to adequately prepare the LCR for timely CCB action.

3.2.3 CCB Review Phase

The request is considered by the CCB. Members of the board are expected to provide feedback ("recommend," "not recommend," or "no objection" statements with as much comment as deemed necessary). The comments and votes are open; they are available for
the rest of the CCB during the process and included in the public minutes. The CCB can request further studies.

The objective is to advise project baseline decisions.

### 3.2.4 Decision Phase

As described in Section 2, the Project Manager, in consultation with the Director, takes the necessary steps to approve or reject the Change Request. Before disposing the request, the Project Manager can also request further studies, clarification and/or revision.

The objective is to make project baseline decisions.

### 3.2.5 Implementation Phase

Project Systems Engineering implements approved changes to documents controlled at project level. The flow down of these changes into subsystem controlled information is the responsibility of the respective subsystems. The LCR is required to list all potentially affected documents, including those under subsystem configuration control.

An approved change does not necessarily trigger a new release of the affected document(s), unless the updated document was approved by the CCB. However, a clear and evident link must be established between the original document and the approved change request, representing a “red lined” section of the document. Upon a new release, the Change Record of the document will explicitly reference the LCRs authorizing the changes. New releases of controlled documents will be announced to the CCB.

The objective is to close the change control action by fully implementing the approved changes or reconciling the potential consequences of a rejection.
4 Change Control Workflow

Processing of Change Requests (LCRs) is managed through a workflow on the password-protected Change Control Board website (https://project.lsst.org/groups/ccb/). The workflow tracks status, records comments, and notifies users of required actions. The workflow also restricts the ability to perform certain actions to only those parties with the authority to do so. The CCB Chair is responsible for ensuring that the workflow progresses to the appropriate conclusion in a timely manner. Each change in workflow status triggers email notifications that alert relevant parties to their required actions. At the workflow’s conclusion, the Document Specialist saves the LCR’s workflow history, which includes the initial submission, comments, and CCB member’s votes, and uploads a PDF to the appropriate LCR-specific collection in DocuShare.

Anyone with Rubin Project credentials can submit a change request. The person who submitted the request, the Chair, and the website administrator can edit the original submission. Once a request has been submitted, the workflow status updates to “Proposed,” and the Chair receives an email notification. The Chair may request additional information, reject the proposal without further consideration, or assign an LCR number and advance the workflow for impact analysis.

4.1 Voting Issue Workflow

During the Analysis Phase, managers and scientific and technical staff should record statements of support, objections, or concerns through the workflow comments. However, formal support documents such as impact analyses or delta versions of documents affected by the proposed change shall be uploaded to the appropriate LCR-specific collection in DocuShare.
If the proposed change(s) would result in changes to the PMCS project plan, the originator will answer “Yes” to the “PMCS Related?” field when submitting the request. In addition to those normally notified by the system, the PMCS Specialist and the Project Manager receive email notifications when PMCS-related LCRs are entered. The PMCS Specialist will record his or her impact analysis in the workflow comments and provide links to any support files uploaded to DocuShare.

If the proposed change(s) would result in changes to the MREFC project plan’s baseline Estimate to Complete (ETC), the originator will answer “Yes, ETC” to the “PMCS Related?” field when submitting the request. In addition to those normally notified by the system, the PMCS Specialist and the Project Manager and relevant Subsystem Manager receive email notifications when PMCS-related LCRs are entered. The PMCS Specialist will record his or her impact analysis in the workflow comments and provide links to any support files uploaded to DocuShare.

If the proposed change(s) would result in changes to the DOE Commissioning Baseline, the originator will answer “Yes, DOE Commissioning” to the “PCMS Related?” field when submitting the request. In addition to those normally notified by the system, the NSF and DOE PMCS Specialists and the Project Manager receive email notifications when PMCS-related LCRs are entered. The PMCS Specialist will record his or her impact analysis in the workflow comments and provide links to any support files uploaded to DocuShare. The DOE PCMS Specialist will then raise a DOE Baseline Change Request (BCR) and include that into the DocuShare collection for this LCR.

Following impact analysis and any adjustments to the LCR resulting from same, the Chair advances the workflow to “Pending” status and adds the LCR to an upcoming CCB meeting agenda. CCB members receive email notifications that the LCR is ready for their
consideration. CCB members shall record their votes using the workflow’s voting mechanism.

If the CCB recommends approval of the LCR, the Chair advances the workflow status to “Approval Pending.” The Project Manager receives an email notification that the LCR is ready for a decision. He or she may select “Approve” or “Denied.”

However, changes that would result in use of contingency funds or loss of schedule beyond certain thresholds require an additional step prior to the Project Manager’s decision. The Project Manager will prepare an NSF approval form to be emailed to Rubin’s NSF Program Officer then advance the workflow to “Approval Pending NSF.” When the Project Manager receives the agency’s decision, he or she will upload the returned, completed approval form to the appropriate LCR-specific collection in DocuShare and advance the workflow to “Approve” or “Denied” as appropriate.

The LCR’s lifecycle ends either when the LCR has been “Denied” or follow-up action items have been completed and the workflow administrator advances the workflow status to “Fully Implemented.”

4.1.1 Requirements Model Updates

In the case of proposed changes to the project’s requirements model, prior to the voting phase, SE will create a model branch and generate a draft document identifying the specific changes upon which the CCB is to vote. LCR submissions shall include clear statements indicating the current requirement ID and language to be changed AND the specific proposed change(s).
4.2 Information Item Workflow

Proposals are designated as information items at submission by selecting “No” in the “Voting Allowed” field.

The Chair advances the workflow to “Pending” status and adds the LCR to an upcoming CCB meeting agenda. CCB members receive email notifications that the LCR will be presented at a future meeting. Prior to the meeting at which the information item will be presented, CCB members and other scientific and technical staff should record any statements of support, objections, or concerns through the workflow comments.

Following the meeting at which the information item is presented, the Chair advances the workflow status to “Approval Pending.” The Project Manager receives an email notification that the LCR is ready for a decision. He or she may select “Approve” or “Denied.”

However, changes that would result in use of contingency funds or loss of schedule beyond certain thresholds require an additional step prior to the Project Manager’s decision. The Project Manager will prepare an NSF approval form to be emailed to Rubin’s NSF Program Officer then advance the workflow to “Approval Pending NSF.” When the Project Manager receives the agency’s decision, he or she will upload the returned, completed approval form to the appropriate LCR-specific collection in DocuShare and advance the workflow to “Approve” or “Denied” as appropriate.

The LCR’s lifecycle ends either when the LCR has been “Denied” or follow-up action items have been completed and the workflow administrator advances the workflow status to “Fully Implemented.”
4.2.1 PMCS-Related Information Items Workflow

If the information item would result in changes to the project plan in PMCS, the originator will answer “Yes,” “Yes, DOE Commissioning” or “Yes, ETC” to the “PMCS Related?” field when submitting the request. In addition to those normally notified by the system, the NSF and DOE PMCS Specialists and the Project Manager receive email notifications when PMCS-related LCRs are entered.

Following impact analysis by the PMCS Specialist he or she will upload the results to the appropriate LCR-specific collection in DocuShare after which the PMCS Specialist will advance the workflow status to “Approval Pending.”

In the case of a DOE Commissioning request, members of the Commissioning team as specified in Section 2, need to have voted to “Recommend” the change before the LCR workflow status is advanced to “Approval Pending.”

In the case of an ETC request, the PMCS specialist and the relevant subsystem manager receive notification emails that an LCR has been submitted. Once Project Controls has determined the cost and schedule impact, he or she will advance the LCR to the “Approval Pending ETC” workflow state. The subsystem manager will receive notification that the LCR is ready his or her approval. If the subsystem manager approves, he or she advances the workflow to “Approval Pending.”

In all cases, the Project Manager receives an email notification that the LCR is ready for a decision. He or she may select “Approve” or “Denied.” Changes that would result in use of contingency funds or loss of schedule beyond certain thresholds require an additional step prior to the Project Manager’s decision. The Project Manager will prepare an NSF approval form to be emailed to Rubin’s NSF Program Officer then advance the workflow to “Approval Pending.”
Pending NSF.” When the Project Manager receives the agency’s decision, he or she will upload the returned, completed approval form to the appropriate LCR-specific collection in DocuShare and advance the workflow to “Approve” or “Denied” as appropriate.

The LCR’s lifecycle ends either when the LCR has been “Denied” or follow-up action items have been completed and the workflow administrator advances the workflow status to “Fully Implemented.”

5 Voting

CCB Board members shall record their votes using the workflow’s voting mechanism.

Members need not attend a CCB meeting to record a vote nor do they need to wait until after a CCB meeting to record a vote. At any time the member is comfortable with his/her vote (until the voting deadline lapses), the vote can be recorded. Therefore, there is no need for proxies.

Members may vote

- Recommend – agreeing the proposed change(s) should be approved,
- Not Recommend – voting for the proposed change(s) to be denied, or
- No Objection – having insufficient stake in the issue to either recommend or object to approval. In balance, “No Objection” is considered a favorable vote.

The Chair sets the voting deadline during the associated CCB meeting, and the workflow administrator registers a comment to each LCR to be voted on, thereby triggering an email notification to all CCB members, including any who were unable to attend the CCB meeting. Any votes not registered by the deadline are assumed to be “No Objection.”
In the case of DOE Commissioning LCRs, specific members of the Rubin Commissioning Team are required to vote.

6 Change Control Board Meetings

Change Control Board meetings are called by the Chair, who is responsible for preparing the agenda and material for the meetings and documenting the comments and recommendations of the Board, as well as the potential action items requested by the Board. The Chair is assisted in these functions by the Document Specialist.

The Change Control Board meets regularly to consider proposed changes to the technical, cost, and schedule baselines. CCB meetings occur the third Wednesday of each month. If a change request is urgent, a special meeting of the CCB can be called. If in a particular month, no change requests are ready to be voted on by the membership, the Chair may cancel the meeting for that month.

The CCB meetings are run by the Chair. At least one (1) week in advance of the CCB meeting, the chair will notify the CCB membership by email of the change requests on which votes will be expected. Regular agenda items include:

- Setting voting deadlines for LCRs ready for a CCB decision,
- Introducing new requests,
- Reviewing the status of action items and ongoing impact studies,
- Reporting on the implementation of approved changes, and
- Reporting and discussing subsystem level changes.

Minutes of each CCB meeting will be taken as necessary to augment the approval, rejection, impact assessment, and notification comments that are recorded on the Change Request
Form. Minutes are posted to the CCB website, uploaded to DocuShare, and emailed to the membership for review.

LCR processing is administered through a web-based system that imposes the appropriate workflow and captures and archives (i) the change request with references to relevant documents, (ii) the comments and recommendations of CCB members, and (iii) the decision. Upon concluding the change control action, the web site generates a document file equivalent to the current Change Request Form that will be posted in the DocuShare collection of the request.

All documents under formal change control must be designated as such in their respective databases.

7 Change-Controlled Document Archiving

When a document has been placed under change control, the Document Manager will apply the Rubin controlled document formatting as demonstrated in Document-9224. He or she will (i) locate the document within the appropriate sub-collection of DocuShare Collection-1821, (ii) ensure that permissions are properly set, and (iii) notify the Subsystem Managers that the document has been placed under change control.

Change-Controlled documents are archived in one of four sub-collections of DocuShare Collection-1821.

1. Design Documents (Change-Controlled) – Collection-2809
2. Interface Control Documents (Change-Controlled) – Collection-2807
3. Plans, Policies, Procedures (Change-Controlled) – Collection-2806
4. Requirements Documents (Change-Controlled) – Collection-2808
Collection-1821 is the home collection for change-controlled documents; however, the documents may be co-located in other collections. If this is the case, the permissions settings for Collection-1821 prevail regardless of the co-location.

Permissions to upload new versions, change the preferred versions, or edit any of the change-controlled documents' DocuShare properties are restricted to members of the Controlled Documents Membership group. The members of this group are

- CCB Chair,
- Project Manager,
- Project Director, and
- Document Manager.