PROCEDURE: NSTXU–PROC–001		Page: 1 of 11
Title **NSTXU Configuration Control**	**Initiated by:** Bob Simmons Digitally signed by Bob Simmons DN: cn=Bob Simmons, o, ou, email=bsimmons@pppl.gov, c=US Reason: I am the author of this document Date: 2011.10.05 08:47:11 -04'00' NSTXU Systems Engineer	**Effective Date:** **10/5/2011**
Concurred by: Judy Malsbury Digitally signed by Judy Malsbury DN: cn=Judy Malsbury, o=PPPL, ou=QA, email=jmalsbur@pppl.gov, c=US Date: 2011.10.05 09:04:13 -04'00' NSTXU Quality Assurance Manager	**Approved by:** Ron Strykowsky Digitally signed by Ron Strykowsky DN: cn=Ron Strykowsky, o, ou=PPPL, email=rstrykow@pppl.gov, c=US Date: 2011.10.05 09:35:15 -04'00' NSTXU Project Manager	**Supersedes:** **Rev 0 (3/3/2011)**

Record of Revisions

Revision	Date	Description of Changes
0	**3/3/2011**	**Initial Issue**
1	**10/5/2011**	**Editorial and Changes to Configuration Processes to Reflect Internal Replanning**

Applicability

This procedure covers changes to the following controlled documents that define the functional or technical requirements, the design configuration of the NSTX Upgrade Project (NSTXU), or cost and schedule baselines associated with the technical baseline:

- Approved NSTXU specifications, including the General Requirements Document (GRD) and System Requirements Documents (SRDs);
- Approved Interface Control Documents (ICDs); and
- NSTXU cost and schedule baselines.

Notes: (1) Approved technical installation and assembly procedures shall be under document control vs. formal configuration control.

(2) Statements of Work (SOWs) do not normally convey technical information, but may do so in isolated instance s(e.g., for specific and focused R&D efforts that will not become part of the NSTXU device) where it is determined that a technical specification is not needed. SOWs will be under revision control, but not configuration control.

Introduction

This procedure describes how the changes to the NSTXU Project baselines (technical, cost, and schedule) are processed and controlled. A change request can be initiated by anyone associated with the Project.

Once under configuration control, the "configuration" of the NSTXU Project may only be changed via the Engineering Change Proposal (ECP) process described in this procedure. An ECP may be a "stand-alone" ECP that addresses discrete and significant changes in which a change of thinking or understanding causes the project to change something that is already under formal configuration change control; or an "omnibus" ECP that addresses small and multiple

changes, may reflect one or more changes that are of a more evolutionary nature in which the design (and the associated cost and schedule impacts) that have advanced to a level of detail, moving beyond but not necessarily changing that which is already under formal change control, or adjustments due to actual cost and schedule performance against established baselines. **Once an ECP is approved, the normal time frame between ECP approval and revision of the impacted documentation shall not exceed 30 days. However, this does not relieve the Project from proper notification of impacted WBS elements and impacted Suppliers – contract amendments/addenda shall be issued in a timely manner with an indication on when the impacted documentation will be updated.**

Note that Engineering Change Notices (ECNs) are covered under an existing PPPL Engineering Procedure (ENG-010).

There are three types of ECPs:

- A "standard" ECP that requires a full review and approval cycle via the NSTXU Change Control Board (CCB). .
- An "expedited" ECP that may be approved with only an abbreviated review. Expedited ECPs are reserved for special instances where:
  - If a pending critical procurement needs to reflect the proposed change;
  - If field activities may be delayed by the normal ECP process involving full reviews and the CCB; or
  - If the proposed change is primarily editorial or minor in nature (e.g., clarifications on drawings for dimensions, tolerances, etc.). ***Note: NSTXU Systems Engineer may make the determination that an ECP is NOT required.***
  - If either the Project or the Supplier notes an immediate need to revise the contract documentation on a turn around period shorter than the normal ECP processing process. These changes are usually minor in nature (e.g., correction of omissions, dimensional clarifications, clarification of the Statement of Work, specification, and/or models and drawings) and generally are anticipated to have only minor or negligible technical, cost, and schedule impact if the appropriate changes can be made quickly so as to minimize or eliminate rework or delay. If deemed prudent by the NSTXU Systems Engineering Support the decision can be made to delay revising the impacted documentation beyond the normal 30 day time period.
- A "minor" ECP that only requires the review and approval of the impacted Engineering Manager (Center Stack Upgrade or Neutral Beam Upgrade) and the NSTXU Project Manager. The NSTXU Project Controls Officer and Systems Engineering Managere will make a recommendation to the NSTXU Project Manager. Generally, a "minor" ECP will be one that:
  - Combines Control Accounts
  - Reflects minor rebaselining of the schedule and/or budget for internal schedule activities that have no impact on the overall project schedule or baseline budgets

If an expedited ECP is deemed appropriate, the NSTXU Project Manager, after consultation with the Center Stack Upgrade and NBI Upgrade Managers, will be the approving authority after an

abbreviated review cycle defined by the Systems Engineer. Nonetheless, following approval of an expedited ECP, the full CCB will review the ECP "after-the-fact" to ensure that major errors and/or omissions were not made. If the full CCB determines major errors and/or omissions that require a modification to the approved "expedited" ECP, a follow-up modification of the ECP will be made in accordance with the NSTXU procedures and this ECP shall be a "standard" ECP.

Note: An ECP will likely NOT be required if the change is of a minor editorial nature. The Systems Engineer will determine if an ECP is needed on a case-by-case basis.

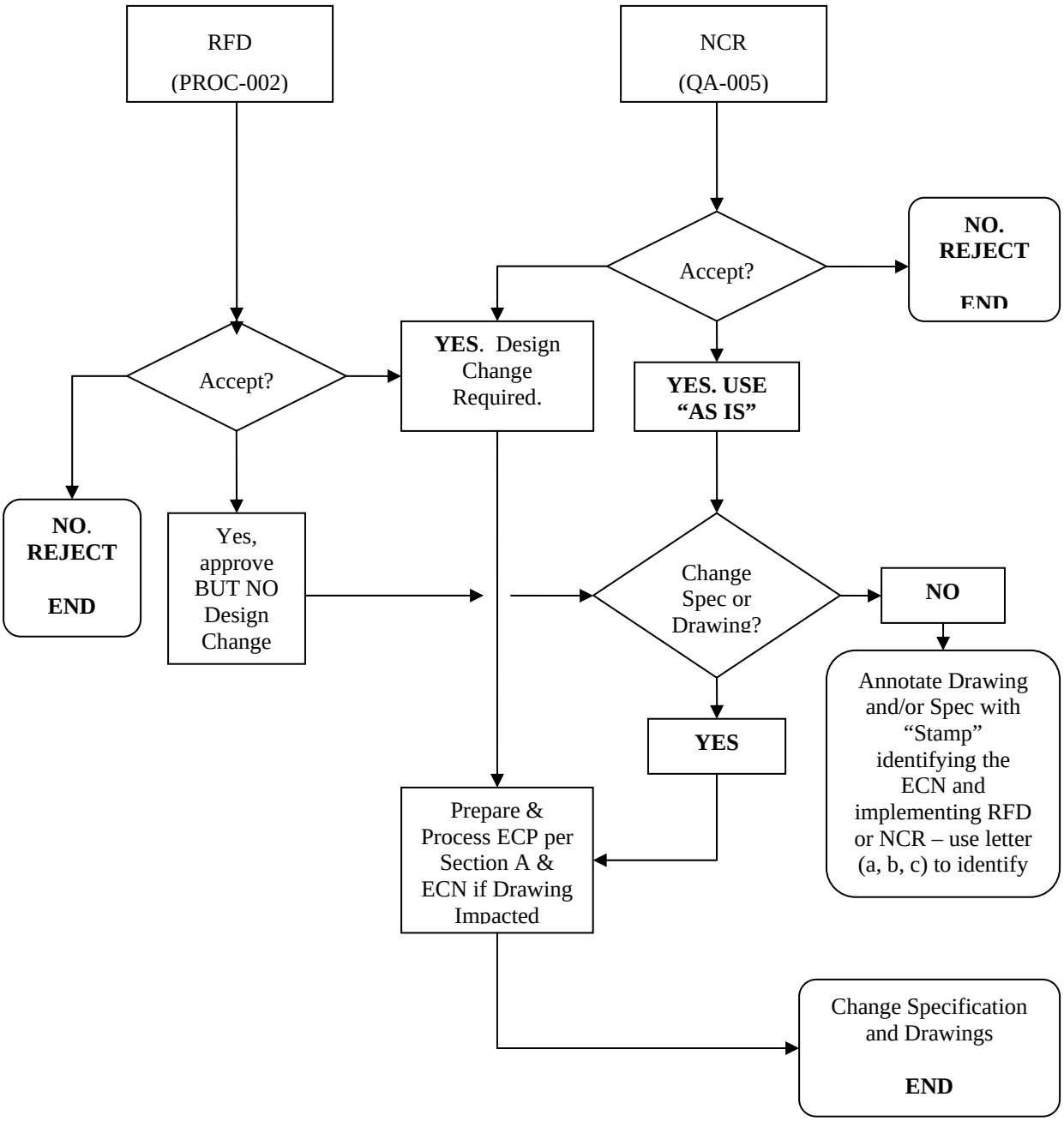
When are ECPS, RFDs (See NSTXU-PROC-002), and NCRs Needed?

The following Table and Flow Chart is intended to summarize in one place when Engineering Change Proposals (ECPs), Requests for Deviation (RFDs), and Non-Conformance Reports (NCRs) are needed and when they are NOT needed:

Type of Document	When Needed	When NOT Needed
ECP	When there is a design change that impacts a Specification (Technical Baseline Requirements) or the Cost or Schedule baselines. Drawing changes (technical baseline) will also impact a Specification since the Specification contains a table that lists the latest drawing revisions. Additionally, an ECP may be used to request application of contingency in cases where: • There is a directed change from DOE in the annual funding or schedule; or • There is a change in the GRD impacting scope and schedule; or • There is a change in the PEP that reflects a change in a Level 1 or Level 2 milestone or redefines PEP deliverables; or • A planned procurement bid is much higher or reflects a significant schedule change; or • Experience has shown that certain estimated work is more complex and will require application of contingency to reflect added complexity **(NOT A RETROACTVE CHANGE).**	Minor editorial changes will not normally require the processing of an ECP. The Systems Engineering Manager will determine whether an ECP is required on a case-by-case basis.
RFD	When either the supplier or PPPL identify a deviation from the established design before the component is fabricated (as indicated in either a Specification or Drawing), a RFD may be submitted to request a deviation either only for this specific component or for all remaining components. In dispositioning a RFD, the determination needs to be made as to whether or not the impacted drawing(s) or Specification need to be revised; if they do, then an ECN and ECP will be required. If the determination is made to not revise either the drawing or Specification, the Systems Engineering Manager will determine if a "stamp" can be placed on the impacted drawing and a note added to the Specification. (See ENG-010)	A RFD should **NEVER** be used to document an after the fact deviation from the requirements – the NCR will be the vehicle to document the change.

NCR	NCRs are used to identify items, services, or activities that fail to conform to specified requirements. The purpose of the NCR is provide a controlled method to prevent the inadvertent installation or continued use of the non-conforming items, services, or activities. As part of the NCR process outline in QA-005, the Project must identify, evaluate, and disposition the specific non-conformance(s), including if deemed necessary, provisions to segregate the item or to stop the specific nonconforming activity or condition causing the nonconformance.	A NCR should **NEVER** be used to document a deviation **BEFORE** it occurs – a RFD shall be used in that case. However, a NCR for a specific issue or nonconformance can lead to a follow-on RFD if it is decided that the specific non-conformance will be accepted for follow on components.

The following flow chart is intended to visually provide an overview of the processing of ECPs that result from either RFDs or NCRs. Section A provides the flow chart for processing an ECP not resulting from either a RFD or NCR.



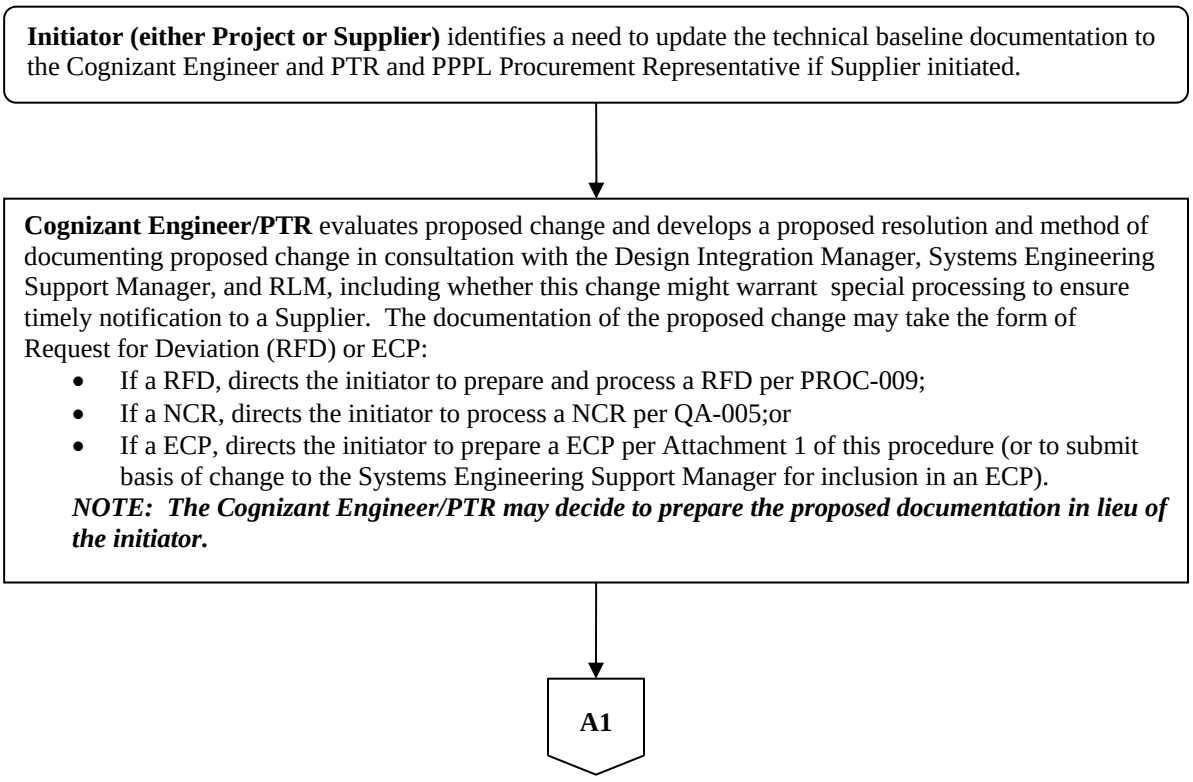
Controlled Document
THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED. Check the NSTXU Engineering Web prior to use to assure that this document is current.

Referenced Documents

PMSD	PPPL Project Management System Description (PMSPD)
PM 1_9	Change Control
PPPL- ENG-006	PPPL Procedure on the Review and Approval of Specifications and Statements of Work
PPPL-ENG-010	Control of Drawings, Software, and Firmware
PPPL-QA-005	PPPL Non-Conformance Reports
NSTXU-PROC-002	NSTXU Request for Deviation Process

A. Procedure for Processing Engineering Change Proposals (ECPs)

Note: NSTXU documents do not all come under configuration control at the same time. Rather, as appropriate for the stage of design, the documents and drawings and models will come under configuration control (i.e., are signed and approved) in a phased manner, with the higher-level specifications and drawings coming under configuration control prior to lower-level specification and detailed drawings and models.



A1

Initiator or Cognizant Engineer/PTR submits the ECP (with any continuation sheets deemed necessary to better explain the rationale for the change) and recommendation whether this ECP requires special handling to ensure timely notification to a Supplier to the Systems Engineer for further processing.

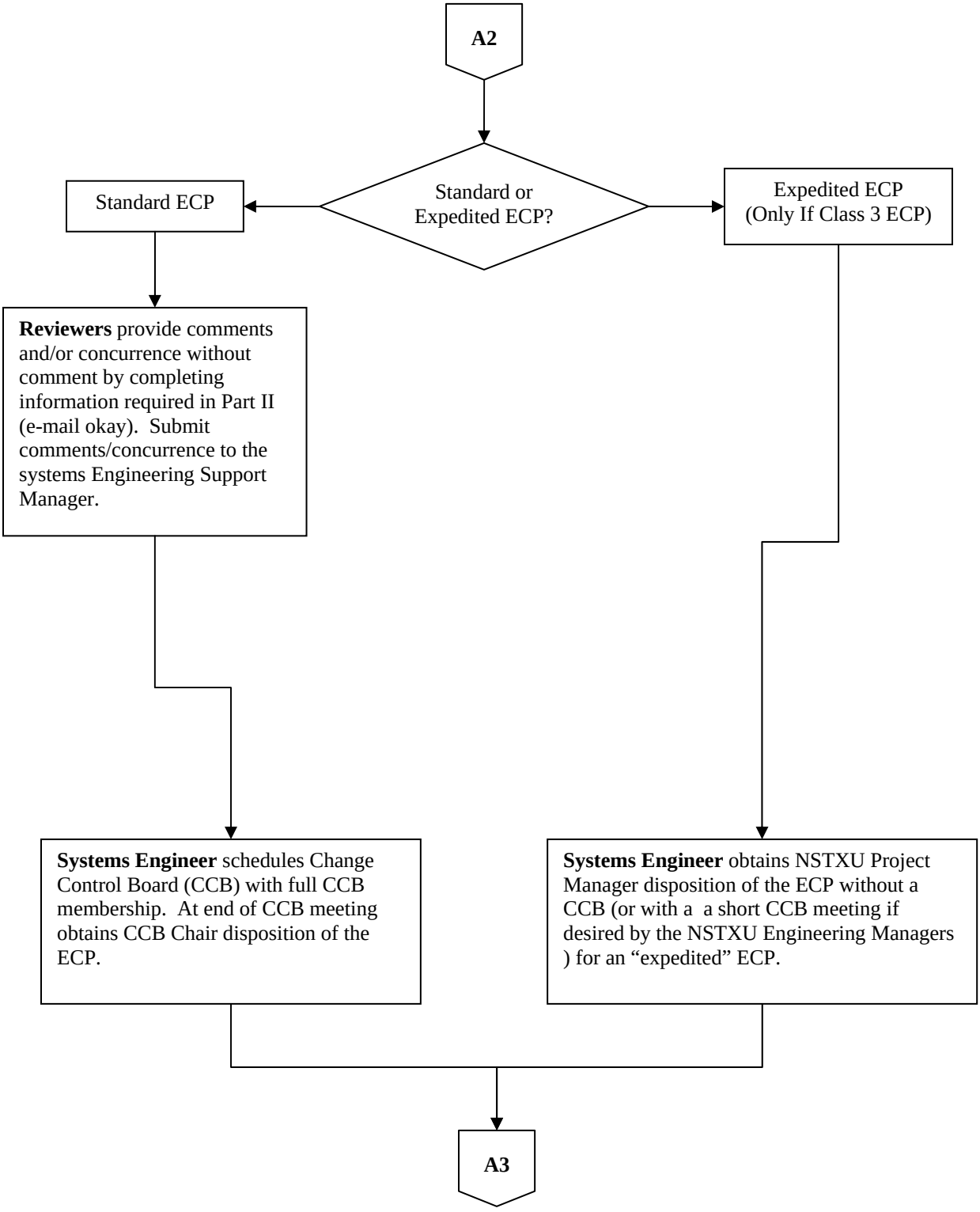
Systems Engineer reviews proposed change, and:

- If required, iterates until the additional amplifying information needed to complete the ECP package. If the ECP form is not already completed , completes the ECP form per Attachment 1 of this procedure;
- Determines whether this ECP should be processed as a "standard" or "expedited" ECP and whether this ECP warrants a special handling to ensure timely notification to a Supplier;
- The change level/class of this ECP (determined by the approving official);
- Completes the ECP Cover Page to include:
  - Initiator of the ECP and date ECP prepared;
  - ECP number in accordance with the following format ECP-XXX, where XXX is a sequential number starting with 001;
  - Descriptive Title of the ECP;
  - Required Reviewers;
  - Action items needed to close out the ECP; and
  - Any amplifying information that might assist in the review and disposition of the ECP
- Posts the draft ECP on the Configuration Management Web page and notifies all reviewers if and if this will be a standard, or expedited ECP.

NOTES: (1) An "expedited" ECP process may only be used for change level/class 3 (Project approval) ECPs. If an "expedited" ECP, the NSTXU Engineering Manager (or his designee) is the approving official. If not an "expedited" ECP, the NSTXU Project Manager (or his designee – usually only the NSTXU Engineering Manager) signs for the Project.

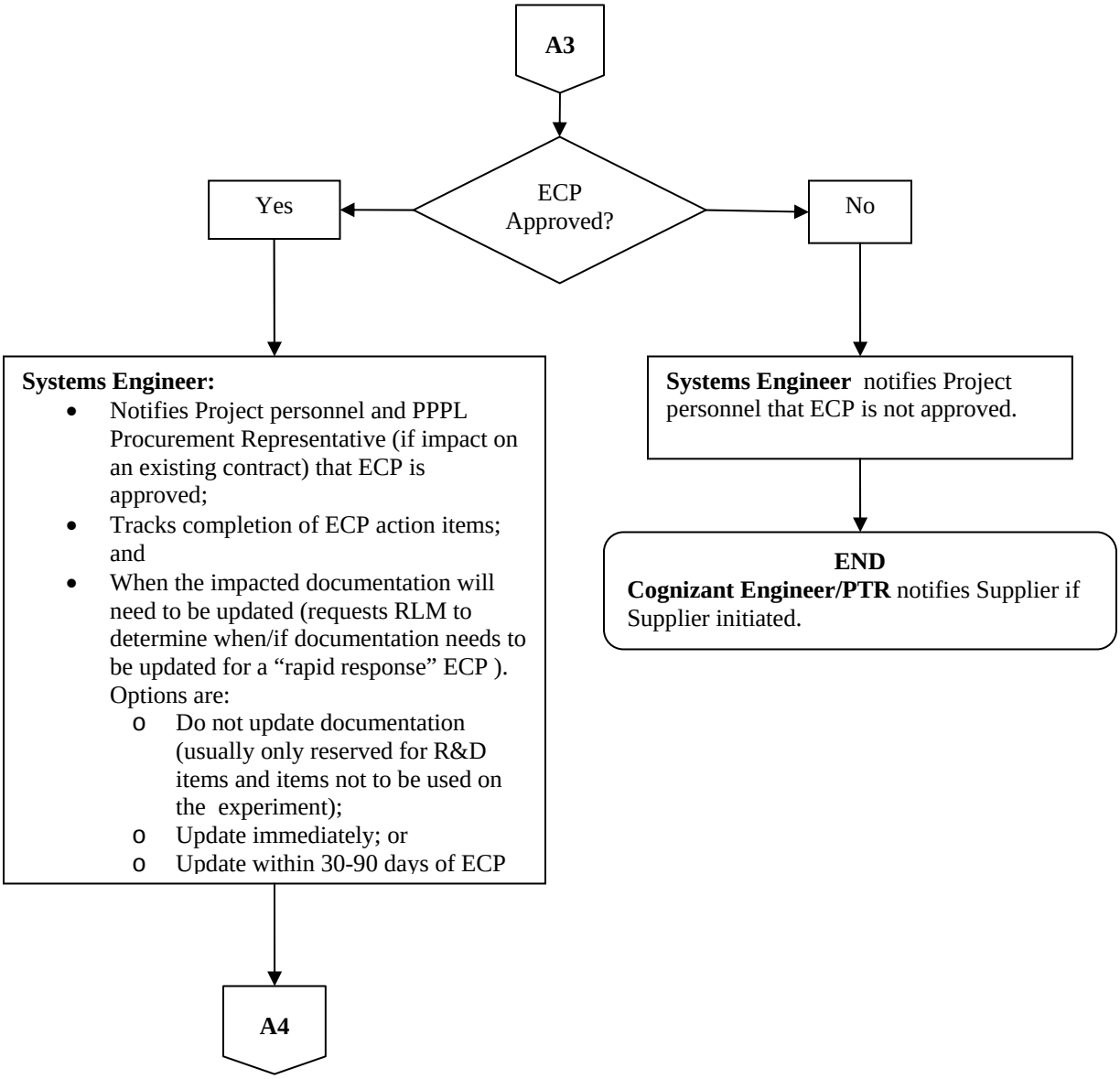
(2) "Expedited" ECPs will normally only be considered for those items with potential impact on existing supplier contract or critical field activities.

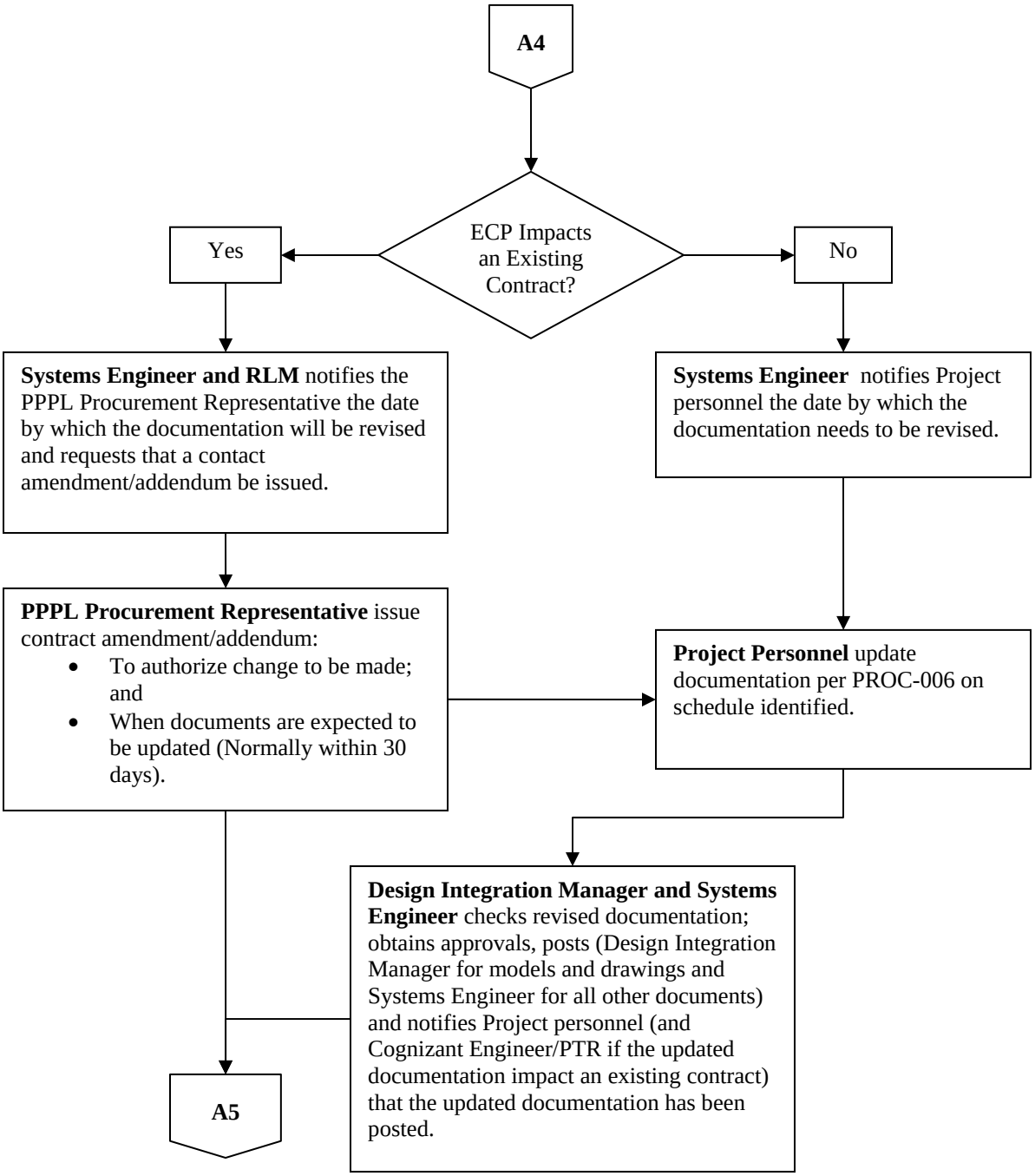
A2



Controlled Document

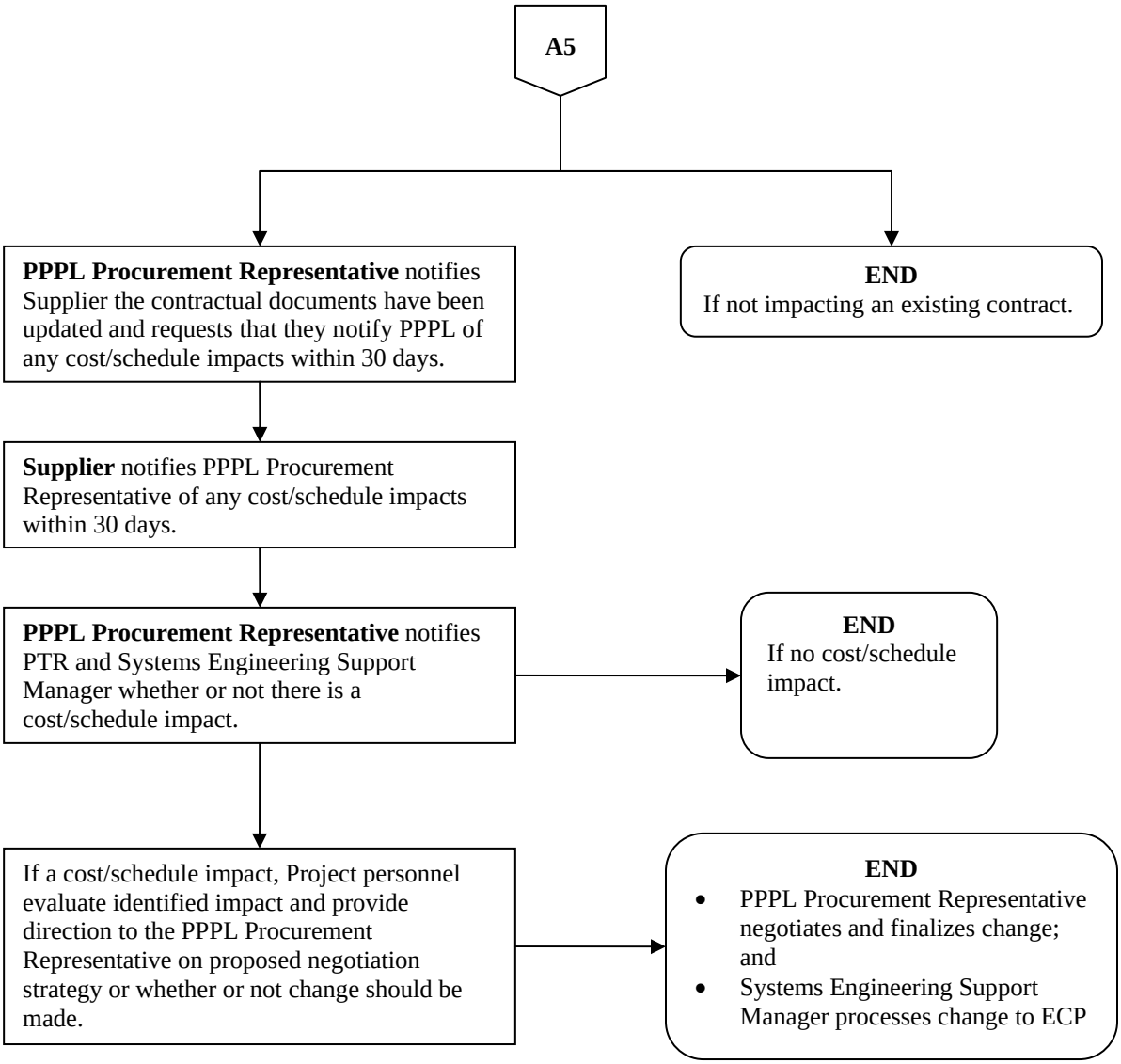
THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED. Check the NSTXU Engineering Web prior to use to assure that this document is current.


A3
ECP Approved?
Yes
No
Systems Engineer:
• Notifies Project personnel and PPPL Procurement Representative (if impact on an existing contract) that ECP is approved;
• Tracks completion of ECP action items; and
• When the impacted documentation will need to be updated (requests RLM to determine when/if documentation needs to be updated for a "rapid response" ECP). Options are:
o Do not update documentation (usually only reserved for R&D items and items not to be used on the experiment);
o Update immediately; or
o Update within 30-90 days of ECP
Systems Engineer notifies Project personnel that ECP is not approved.
END
Cognizant Engineer/PTR notifies Supplier if Supplier initiated.
A4



Controlled Document

THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED. Check the NSTXU Engineering Web prior to use to assure that this document is current.



Attachments

1 - ECP Forms (Cover Page and Part I) 2 – Reviewer Comment Form (Part II)

NATIONAL SPHERICAL TORUS EXPERIMENT UPGRADE PROJECT
Engineering Change Proposal (ECP)

COVER PAGE
(TO BE COMPLETED BY SYSTEMS ENGINEERING SUPPORT MANAGER)

Originator:	**Date:**
ECP No:	**ECP Title:**

Required Reviewers

Required Reviewers for this ECP:

ECP Approval Level

Expedited ECP? ☐ **Yes** ☐ **No**
Change Level: 3 Project
Approving Official: 3 Reg ECP - Project Manager

Actions

APPROVALS
(TO BE COMPLETED BY APPROVING OFFICIALS)

Change Level	Approving Official	Approval?	Signature
3	NSTXU Project Manager	☐ Yes ☐ No	
3a (Expedited ECP)	NSTXU Engineering Lead	☐ Yes ☐ No	
2	NSTXU Federal Project Director	☐ Yes ☐ No	
1	Director of Science, SC-1	☐ Yes ☐ No	
0	Deputy Secretary of Energy	☐ Yes ☐ No	

NATIONAL SPHERICAL TORUS EXPEREIMENT UPGRADE PROJECT
Engineering Change Proposal (ECP)

PART I
(TO BE COMPLETED BY ORIGINATOR)
ECP-

Originator:	**Date:**

Overview of Change

Type of ECP: ☐ **EXPEDITED** ☐ **STANDARD**

Type of Change: ☐ **TECHNICAL** ☐ **COST** ☐ **SCHEDULE** ☐ **EDITORIAL**

(Check all that Apply)

Reason for Change:

Impacted WBS Elements:

Impacts of Change (Briefly Describe):

Does this Change Impact Material Already Procured or Parts/Assemblies Already Assembled/Manufactured using this Material: ☐ **Yes** ☐ **No**

If "Yes", what is the recommended disposition of this material/part/assembly?

Assessment of Other Options:

Controlled Document

THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED. Check the NSTXU Engineering Web prior to use to assure that this document is current.

NATIONAL SPHERICAL TORUS UPGRADE PROJECT
Engineering Change Proposal (ECP)

PART I
(TO BE COMPLETED BY ORIGINATOR)

Originator:	**Date:**

Detailed Description of the Change:
(Use Continuation Sheets and/or Attach Information/Sketches, As Needed)

List Attachments, Impacted Documents, etc.

Description of Change:

NATIONAL SPHERICAL TORUS UPGRADE PROJECT

Engineering Change Proposal (ECP)

PART I CONTINUATION SHEET
(TO BE COMPLETED BY ORIGINATOR)

Originator:	**Date:**

Reviewer Comment Guidelines

Reviewers will complete a reviewer comment sheet (either using the Part II form included in this procedure or in any other acceptable format such as e-mail, word, etc.). The reviewer comment sheet shall contain at a minimum the following information:

- ECP Number and Title;
- Reviewer Name;
- Indications on whether or not corrections needed and the specific modifications/corrections needed (e.g., additional reviewers, correction to impact statements, modifications to the ECP to include other impacted documents, etc.);
- Whether or not the reviewer concurs in the ECP without comment or concurrence if recommended modifications/corrections are made.

This information should be submitted to the Systems Engineering Support Manager who will tally all the comments and attempt to reach a resolution with the ECP initiator.

A sample Part II of the ECP form is follows in this attachment if the reviewer opts to utilize it.

NATIONAL SPHERICAL TORUS UPGRADE PROJECT

Engineering Change Proposal (ECP)

PART II

(TO BE COMPLETED BY REVIEWERS)

ECP No: **ECP Title:**

Reviewer:

Corrections Needed? ☐ **Yes** ☐ **No**

- **If yes, identify corrections needed:**

Concur? ☐ **Yes** ☐ **No**

- **Provide reasons for concurrence/rejection:**

Other Recommendations? ☐ **Yes** ☐ **No**

- **Identify Recommendations**

NOTE: Forward completed Part II to Systems Engineering Support Manager via e-mail indicating that your review is completed.

Controlled Document

THIS IS AN UNCONTROLLED DOCUMENT ONCE PRINTED. Check the NSTXU Engineering Web prior to use to assure that this document is current.

NATIONAL SPHERICAL TORUS UPGRADE PROJECT

Engineering Change Proposal (ECP)

PART II CONTINUATION SHEET
(TO BE COMPLETED BY REVIEWER)

Originator:	**Date:**

NOTE: Part II – Review Form will be multiple pages from each reviewer.