71-970730-CLN-01

TO: R CAMP
FROM: C NEUMEYER
SUBJECT: NSTX AUDIT #9702 FINDINGS

Reference:

"Audit #9702 - NSTX Quality Assurance", R. Camp to M. Ono, P. Heitzenroeder, C. Neumeyer, 6/19/97

Following is in response to the reference audit findings, along with an action list.

Note: Actions assigned to C Such, E Perry, T Egebo, C Neumeyer, and S Kaye.

Observations

1. One engineer involved in the project did not know that a revision to the Documents and Records Plan had been issued (with a new drawing designation scheme). The notification method may be inadequate.

Response:

Memo 97-0729-CLN-02 has been issued to establish a Standard Distribution List for NSTX controlled documents. The list will be maintained by the NSTX Document Administrator. WBS Managers are responsible for ensuring that people working in their area are included.

Action: None

2. The role of the Operations Center in regard to NSTX or Advanced Projects is not clear. It has not been proceduralized or passed-down from the former NSTX Documents Administrator.

Response: In context of NSTX present role is that defined for the NSTX Documents Administrator. Duties of the NSTX Document Administrator are given in the NSTX File Share Guide as well as the various NSTX procedures.

Action: None

3. The NSTX Engineering Manager has indicated that the SDD for WBS 1, Magnet Systems, on the WEB site is not the most recent draft.

Response:

Project participants will endeavor to keep the documentation on the server up to date. The latest WBS13 SDD (Draft E) been placed on the server. A signed off version which incorporates the entire TF coil (including the outer legs, which until recently were not designed in detail) is imminent (will be available following the July FDR of the vacuum vessel and outer legs of the TF.

Action: None

4. The list of Design Review chairpersons needs to be put in the "General Info" folder as required by NSTX-PROC-004.

Response: This will be done.

Action: #1 - NSTX Document Administrator (C Such) to put the list of assigned design review chairs on the server.

5. The title of NSTX-PROC-004 on the WEB page is wrong.

Response: The title of this procedure is "NSTX Design Verification". The name will be corrected on the NSTX Controlled Document List.

Action: #2- NSTX Document Administrator (C Such) to correct the title.

6. Calculations are not listed on the controlled document list (there were 11 calculations in the file). The auditor could not determine if these were all the approved calculations.

Response: Since the calculations are controlled documents, they will be moved into the Project Control Documents Folder and be included in the NSTX Controlled Documents list.

Action: #3 - NSTX Document Administrator (C Such) to move the Calculation Folder documents to the Project Control Documents Folder on the server and add them to the controlled list.

Recommendations

1. While the current NSTX Configuration Control system as documented in NSTX-PROC-006 is adequate for the current state of the project, once changes are planned for existing D-site systems, the impact of these changes must be reviewed.

a. These changes must be reviewed for their impact on systems such as HVAC or fire protection.

Response: J Levine is a member of the TRB and will review all changes in this context.

Action: None

b. These changes must be reviewed for their impact on TFTR Caretaking. Plans include having the Head, Engineering & Technology Development Department, in the review cycle for all changes. While modifications to the NSTX procedure on configuration control have been proposed and reviewed, they have not been adopted.

Response: NSTX and TFTR Caretaking have reached agreement with respect to the implementation of a revised version of OP-AD-104 (DCA procedure) which will satisfy this need. Refer to memo 71-970728-CLN-01, "NSTX & D-SITE Configuration Control"

Action: None

c. The concept of formally turning over systems and areas from TFTR to NSTX has been discussed but not proceduralized.

Response: NSTX will obtain approval for use of D-site equipment via the TFTR procedure OP-AD-112.

Action: None

d. For the TFTR DCA system, a list of drawings requiring changes are provided to the Drafting organization. As the work for the DCA system proceeds, sometimes additional drawings are identified that also require changes. Drafting allows these changes to occur as long as the drawing number are added to the DCA drawing list and the cognizant engineer initials the addition. Should a similar consideration be added to the NSTX system?

Response: Based on the aforementioned agreements, NSTX will use the DCA system when it comes to drawing changes, so the requested feature will be in effect.

Action: None

2. The need for trained construction safety personnel for NSTX should be reviewed.

Response: Prior to commencing activities at D-site (1 October 1997) NSTX will establish its construction organization, and will identify the safety representatives.

Action: #4 - E Perry (NSTX Construction Manager) to identify construction organization, including safety representatives.

3. Drafting issues for NSTX should be resolved.

a. The role of sketches in NSTX is not defined. It is hoped by some there is no role for them.

Response: Unless a drawing has a number, it has no formal pedigree in the NSTX system.

Action: None

b. There is no policy for the number of pending changes or time before a drawing is updated. While cognizant engineers are required to provide a job number to be used by Drafting to update the drawings, the job number may no longer be open if changes are delayed.

Response: NSTX will depend on its WBS managers to follow the preparation, revision, and release of drawings. Since NSTX is a fairly fast moving construction project, compared to TFTR which was a fully matured project at end of life, there should be less of a tendency for the situation of concern.

Action: None

4. There is no system defined for the storage of procurement related documents, such as operating guides or test results. It is recommended that the NSTX Documents Administrator maintain copies of these important records.

Response: NSTX plans to have the NSTX Document Administrator store these in the Ops Center. Procedure NSTX-PROC-007 (sign off is imminent) addresses this.

Action: None

5. Some interviewees believe that the NSTX Configuration Control system should be computerized to reduce the dependency on paper and increase the visibility of the changes to all NSTX personnel and Drafting. NSTX should review the appropriateness. Issues involved include:

a. WBS Cognizant Engineers are responsible for the entire change request cycle, from initiating the change request form to closing it out. While these individuals should have ownership for their changes, is it likely that formal closure will be overlooked due to other work activities? Computerizing the system would allow the open changes to be easily identified.

Response: Both the NSTX and TFTR DCA change control procedures require closeout. In so far as status is concerned, a log of NSTX changes is being maintained, which will indicates status.

Action: None

b. Is computerization feasible given the paper documents associated with change requests?

Response: There will always be some hard copy items which are not convenient to digitize. Maybe this will become easier to do in the future but...I believe that the main benefit of computerization would be in the review/comment/sign-off area. However, NSTX does not have resources identified to break this new ground.

Action: None

c. Approved change requests and status (open, closed) needs to be readily available to Drafting to identify if drawing changes are allowed.

Response: Again, NSTX is keeping a log of changes.

Action: None

6. NSTX should clarify the applicability of Davis Bacon to individual tasks.

Response: NSTX plans to reach formal agreement with the DOE Project Manager with regard to specific tasks covered by Davis Bacon. The project wishes very much to avoid situations where, during construction, there is confusion and/or questions about what is and is not covered. It all needs to be decided in advance.

Action: #5 - T Egebo (NSTX Project Control Manager) to pursue this agreement.

AUDIT FINDING REPORT

AUDIT NO.: __9702___ FINDING NO.:__1___

AUDIT NAME: ___NSTX Quality Assurance _____

AUDITED ORGANIZATION: ____NSTX_____

DATE OF AUDIT: _____June 9 through June 13 1997_____

REFERENCES:

NSTX-PLAN-PEP-032, Project Execution Plan (PEP)
NSTX Configuration Control, NSTX-PROC-006, Rev. 0

PROGRAM REQUIREMENTS:

Requirements are listed within the finding section.

FINDING:

The method for establishing control of the design basis as described in the Project Execution Plan is not consistently implemented. This is supported by the following:

1. The PEP, table 9-1, page 22, has the System Requirements Documents (SRD) incorporated into the configuration control system after the Engineering Cost and Schedule Review (EC&SR). The EC&SR was held July 1996. At the time of this audit, only one SRD, Magnet Systems, has been approved. Significant design work has proceeded in some areas without an approved SRD. An example is the design of plasma facing components. For this system, a preliminary design review is scheduled for the end of June 1997 and a final design review the end of July 1997, but the associated SRD has not been approved.

Response: This situation has resulted from several factors....

- after the ECSR, activities were shutdown in several WBS areas in order to conserve funds
- after the ECSR a decision was taken to move to D-site, which required that new conceptual designs be developed for several WBS elements
- at the time that the PEP was written there was a high level of sensitivity to the use of the terms CDR, PDR, FDR, etc. So, references was made to the term ECSR in lieu CDR. In fact the ECSR was a CDR, and the intent was to place the SRDs under configuration control following the CDR (and related chit resolution and incorporation) so as to provide a firm set of requirements with which to begin the preliminary design phase. So, the chronological association of the ECSR causes some difficulty in this context.
- in the application of the resources of the project, priority has been given to solving technical problems over the preparation of documentation

The project is now working very hard to bring all SRDs up to date and obtain approval signatures.

It is emphasized that the requirements themselves are well defined at this time, and documented in the SRDs, even though they are not all signed off. So, from a practical point of view, the system engineering of the project is under control.

The PEP will be revised to eliminate the reference to the ECSR as the starting point for configuration control of the SRDs. Instead, the starting point will be changed to after the CDR and related chit resolution.

Action: #6 - C Neumeyer (NSTX Project Engineering Manager) to pursue revision to PEP.

2. The PEP, table 9-1, page 22, has the Systems Design Descriptions (SDDs) incorporated into the configuration control system after the final System Design Review. The Magnet system SDD has not yet been approved due to the fact that the components are in different stages of design. Some components, such as the TF bundle, have been awarded for fabrication; other components are in the early design stage.

Response: This situation has resulted from several factors....

- after the February Final Design Review there were several chits outstanding which needed to be resolved prior to finalizing the SDD for the center stack magnets.
- the procurement process was initiated before finalizing all details of the design and finalizing the SDD so that we could maintain the schedule. The risks were judged by engineering to be acceptable. This has proven out as the design details have been developed fully in time for the award of contracts for the TF bundle and OH coil.
- it was decided to delay the sign off of the SDD until the outer leg TF coils were designed. The outer legs final design (which is intimately related to the vacuum vessel design) will take place as part of the July 31 review.
- in the application of the resources of the project, priority has been given to solving technical problems over the preparation of documentation

It is emphasized that the design development , albeit lacking a signed out SDD, has been carefully coordinated with the procurement, and that no contracts would be awarded if design uncertainties existed. So, from a practical point of view, the engineering of the project is under control and undue risks are not being taken.

Action: None

3. The PEP on page 15 specifies that the System Requirements Documents include the Interface List as appendices. The SRDs reviewed did not contain this information. It is included in many of the SDDs, but the information is not current and complete. At least one WBS manager indicated that the lack of clearly defined interfaces complicates his effort. Note the various WBS packages are at different levels of design detail; this complicates the process for formalizing the interfaces.

Response: The PEP will be revised to reflect this change in philosophy. In designing the formats of the SRDs and SDDs it was judged more appropriate to put the interface lists in the SDDs.

Action: #6 - C Neumeyer (NSTX Project Engineering Manager) to pursue revision to PEP.

4. The PEP on page 15 specifies that the Project Requirements Document (PRD) defines the NSTX operational features and performance required to fulfill the mission while the General Requirements Document (GRD) translates the PRD into engineering terms and provides other generally

applicable engineering requirements. The list of baseline diagnostics differ between the PRD and the GRD.

Response: The selection of diagnostics has been an evolutionary development, as the objectives of the research program of NSTX have begun to crystallize. The NSTX PAC has had a significant input to this process. Now a new baseline has been selected which is in the WBS4 SRD. A GRD revision is being developed which, among other things, will reflect this new baseline.

Action: None

5. The PRD references a Physics Description Document which does not exist. The Physics Description Document is not required in the PEP.

Response: The PDD exists, but was written very early in the pre conceptual phase of NSTX. It is now obsolete. It is not required by the PEP. So, reference to it will be deleted in the next revision of the PRD.

Action: #7 - S Kaye (NSTX Physics Manager) to pursue revision to PRD to delete PDD reference.

6. The NSTX Configuration Control procedure covers changes to the PRD, GRD, SRDs, SDDs, Baseline Cost and Schedule, Drawings, and "relevant lower level NSTX design documents." It is not clear what is included in the quoted section. For instance, the team questioned whether specifications and statements of work were included. However, NSTX-PROC-005, Development of Specifications & Statements of Work, section B, indicates that the process for revisions which does not include NSTX-PROC-006. Clarification is required.

Response: The specifications themselves are not under configuration control. So, unless the baseline design or performance is effected by a specification change, there is no motivation for a configuration control action. The philosophy is to avoid complicating the revision process so that the procurements can be performed efficiently. The responsibility is placed on the cognizant engineer to exercise careful judgment.

Action: None

RECOMMENDED CORRECTIVE ACTION:
Note: Recommendations are suggestions only. Specific action taken to resolve the finding is at the discretion of the audited organization.

NSTX management should review the requirements of the Project Execution Plan for relevancy and appropriateness for establishing and controlling the design basis. A Risk Assessment of limited scope could be a worthwhile tool to assist this activity. The plan, once approved, should be implemented.

Response: The plans set forth in the PEP are relevant and appropriate for establishing and controlling the design basis. However, as the work of the project is undertaken, circumstances sometimes render features of the model foreseen by the PEP obsolete or impractical. In order to proceed on a timely basis with the essential work, given the available resources, the project takes decisions and applies resources as it judges to be in the best interest of delivering the end product on schedule and within budget. Some risks are involved, but these are carefully considered . The use of a formal risk assessment procedure is not appropriate for a project of the scale and budget of NSTX. The project relies on the good judgment of responsible engineers and managers.

Action: None

SUMMARY OF ACTIONS

Note: List been added by the writer to the NSTX Action Item List on the server (Engineering Folder, NSTX Action Lists, NSTX Action List 7/30/97).

#	**Description**	**Assignment**	**Due**
1	Put the list of assigned design review chairs on the server.	C Such	8/15/97
2	Correct the title of NSTX-PROC-004 on NSTX Controlled Document List. It should be "NSTX Design Verification".	C Such	8/15/97
3	Move the Calculation Folder documents from the Engineering Folder to the Project Control Documents Folder on the server and add the calculations to the controlled list.	C Such	8/15/97
4	Identify construction organization, including safety representatives.	E Perry	9/1/97
5	Pursue formal agreement with the DOE Project Manager with regard to specific tasks covered by Davis Bacon.	T Egebo	9/1/97
6	Pursue revision to PEP to replace ECSR milestone for SRD configuration with CDR milestone, and change location of interface list from SRD to SDD	C Neumeyer	9/1/97
7	Pursue revision to PRD to delete PDD reference.	S Kaye	10/1/97

cc:

J Spitzer R Wilson L Dudek R Kaita S Ramakrishnan
D Bashore T Egebo E Perry M Peng M Ono
P Heitzenroeder S Kaye R Strykowsky
J Malsbury H Neilson C Such NSTX File