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LLNL-TR-676262

Internal Independent Assessment Report - CASTLE-PX SQA

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April 1, 2015

Disclaimer

Auspices Statement

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

Internal Independent Assessment Report		LLNL
ITS No. 38618	CASTLE-PX SQA, Nuclear Weapons Engineering Program, WCI	**Date:** March 24, 2015
Assessment Team: Darrel Whitney, Lead Assessor, MAS Organization Lisa Dancy, Assessor, Weapons Quality Assurance Manager, LFO Vicki Pope, Assessor, MAS Organization	**Areas Assessed:** The flow down of institutional SQA requirements to the CASTLE-PX software effort and the implementation of those SQA requirements	**Assessment Response Owner:** Susan Taylor, Associate Program Director for Stockpile Support, NWEP

Assessment Basis and Scope:

The purpose of the independent internal assessment (IIA) is to assess the flow down of institutional software quality assurance (SQA) requirements to the CASTLE-PX software effort and the implementation of those SQA requirements. The assessment was requested by the CASTLE-PX software project in the Nuclear Weapons Engineering Program (NWEP).

The DOE Order 414.1D Admin Chg. 1, *Quality Assurance*, defines the actions and processes that are required to ensure the quality of safety software (aka 830 Software) at defense nuclear facilities. The LLNL 830 Institutional Software Quality Assurance Program (830 ISQAP) was approved May 16, 2014 by the Livermore Field Office (LFO) and satisfies the *Quality Assurance* Order quality assurance requirements for safety software (aka 830 Software). The 830 ISQAP implements those requirements through the DES-0111, *830 Institutional Software Quality Assurance Program*; PRO-0110, *Identification, Documentation, Control, and Maintenance of the 830 Software Inventory*; and PRO-0107, *Software Risk Grading.* The requirements of the approved program (including approved consensus standards) for 830 Software flow down via required document templates for a *Software Quality Assurance Plan*, a *Software Configuration Management Plan*, and a *Software Verification and Validation Plan*.

LLNL is still executing the corrective actions to fully implement the revised 830 ISQAP. The creation of the three required governing documents per the required document templates is in process. The assessment will be based on the SQA requirements as flowed down via the required document templates, yet will use existing documents to determine the extent to which the revised requirements are being met. Self-identified SQA gaps are already covered as part of the existing corrective actions and will not be reported as deficiencies in

this assessment report.

The key steps of the IIA were conducted on the following dates:

Preparation:	January 30 to February 20, 2015
Entrance Meeting:	February 23, 2015
Performance:	February 23 to March 6, 2015
Exit Meeting:	March 9, 2015
Draft Report Preparation:	March 6 to 16, 2015

The results of the IIA including the assessment plan, CRADs, assessment report, supplemental checklists, and the transmittal memorandum will be entered into the Issues Tracking System (ITS) as required by procedures PRO-0042 and PRO-0050.

Executive Summary:

This IIA assessed the flow down of institutional 830 Software Quality Assurance requirements through three required document templates to the CASTLE-PX software effort and the implementation of those SQA requirements. The templates flow down the DOE O 414.1D consensus standard requirements for Safety Software. This assessment did not include the flow down of NAP-24, *Weapon Quality Policy*, requirements.

The assessment focused on the CASTLE-PX project's software development and release processes. It did not assess Pantex's acceptance or usage of the software.

The assessment resulted in 3 Deficiencies, 5 Observations, 1 Recommendation, and 3 Strengths.

Overall the CASTLE-PX team demonstrated it values quality and has worked to integrate quality practices into its software development processes. Improvement in documentation will enhance their SQA implementation.

Assessment Detail:

This IIA was conducted at the request of the CASTLE-PX Project.

The CASTLE-PX Project is in the maintenance phase of the software life cycle funded through PRIDE (Product Realization Integrated Digital Enterprise). There are ongoing maintenance changes, which result in approximately two releases each fiscal year. The changes for each release are approved by the project Change Control Board (CCB) with representatives from LLNL, Pantex, and other stakeholders. LLNL does formal testing of the product and then provides the software to Pantex for their formal acceptance testing. A new CASTLE-PX version is released for production installation per Pantex procedures only

after both LLNL's and Pantex's testing demonstrate successful execution of the software. The Pantex acceptance testing and eventual use of CASTLE-PX is not included in this assessment.
A joint assessment was conducted in 2009 with participants from LLNL, Livermore Site Office (now Livermore Field Office), Pantex, Pantex Field Office, and NNSA NA-00. The assessment identified 5 Weaknesses (non-systemic deficiencies), 5 Observations, and 2 Strengths. Gaps were closed as a condition of acceptance of CASTLE-PX by Pantex.

The LLNL ISQA Program was revised as part of a corrective action plan (CAP) to address SQA program level deficiencies. The revised ISQA Program was approved by LFO in 2014. Additional corrective actions are being executed for each software title on the LLNL 830 Software Inventory. The current corrective action is to close the SQA gaps identified as a result of flowing down the revised ISQA Program. CASTLE-PX is in the process of closing its self-identified gaps. Requirements not met that were self-identified are categorized as observations, because they are already included in the existing CAP.

The template checklists were used to ensure the flow down of requirements was fully assessed. Each document template had an assessment team member as a lead with responsibility to assess both the flow down of requirements and the implementation of requirements. The checklists were used for making assessment notes. Those notes were then used to compile this report. The attached checklist contains only a summary for each template item.

The assessment team reviewed CASTLE-PX formal and informal documents, procedures, and files, TeamForge and TestLog entries, and interviewed key CASTLE-PX personnel on special topics. The team met daily for assessment activities and met with CASTLE-PX personnel as needed.

The CASTLE-PX team has begun the process of moving from TeamForge, which will no longer be supported by LLNL, to the Atlassian tool suite. Although this assessment focused on the TeamForge usage and records as the current state, the migration plans to Atlassian were reviewed and suggestions were informally made during the assessment to facilitate and improve that process. Some history will be lost, but the assessment team did not deem the loss as significant for project continuity.

Because the CASTLE-PX Project is currently in the process of an Institutional SQA CAP, the project team requested additional feedback from the assessment team on the conversion of their documents to the new required document templates. That feedback is provided as additional comments to their template self-assessment crosswalk in Attachment 6. The comments in that attachment also serve as support of the incomplete document crosswalk observation [O-2].

Issues were categorized according to the following definitions from PRO-0050, *Internal*

Independent Assessments:

Deficiency	A condition, event, procedure, or operation that is not in compliance with the requirements of applicable federal, state, and/or local laws and regulations, the LLNS Contract, or the LLNL-specific implementing procedures/manuals.
Observation	A compliant condition, event, operation, or practice that warrants action tracking or is included for trending purposes to identify future potential areas for improvement. (Self-identified gaps already covered by a currently executing CAP are included in this category.)
Strength	A practice or condition that is especially efficient, effective, or beyond normal performance expectations.

The original assessment plan indicated that the CASTLE-PX qualification package as attached to the LLNL 830 Software Inventory web site would be reviewed. However, a qualification package is for usage at LLNL. CASTLE-PX is used at Pantex, therefore a LLNL qualification package is not required for CASTLE-PX and as such was not reviewed.

CR-1: SOFTWARE QUALITY ASSURANCE PLAN AND IMPLEMENTATON

Discussion of results

The *CASTLE Project – Software Quality Assurance Plan* (will be referred to as the SQAP), based on the IEEE Standard 730-2002, *IEEE Standard for Software Quality Assurance Plans*, generally met the institutional SQAP template and where it did not, the CASTLE-PX SQA Officer identified those gaps in a document crosswalk. Most areas needing improvement were a matter of adding boiler plate text introducing sections or rearranging the order of subsections to better align with the new templates. In the cases where NQA-1 requirements have been incorporated into the institutional templates, it was demonstrated through interviews and other document reviews that the flow down of requirements were being met with the exceptions noted in the identified CR-1 deficiency and observation.

Project documents and records, including those for requirements, design, code, testing, meeting/review minutes, and change requests, are contained in a workflow, which is managed by the TeamForge Collaborative Development tool suite. TeamForge captures the history of document and record changes. The assessment team was informed by the CASTLE-PX Project Leader that the transition from TeamForge to the Atlassian tool suite will be complete in June 2015.

The CASTLE-PX SQAP adequately identifies the scope of the CASTLE-PX project, the roles and responsibilities of all levels of project participants, schedule and needed resources. Additional detail is needed for the life cycle phases and how transition between phases is accomplished, as well as identifying key components (namely, the design organization) of

the organization chart and a description of the independence/freedom of the evaluation/testing personnel. These gaps were self-identified by the CASTLE-PX SQA Officer via the documented crosswalk.

All required documents have been written and are being followed as verified by review of the history of the documents themselves and interviews with the CASTLE-PX personnel. Formal documents are managed through a document review and approval process and have signatures, as appropriate. The one exception to this is the *CASTLE Project – CASTLE-PX Software Design Document (SDD)*. Although much of the detailed design is captured in the *CASTLE Project – CASTLE-PX Requirements and Implementation Specification*, which has been reviewed and approved by the appropriate organizational representatives, the SDD document does not have a signature approval page, thus resulting in a deficiency in this area. In addition to the required documents, the CASTLE-PX team has several additional planning and tracking documents to support the development and deployment effort, including standards and conventions for the developers. Although a discussion on metrics was not part of the CASTLE-PX SQAP, the SQA Officer presented several metric evaluations performed on the CASTLE project over the last few years.

The document reviews identified in the SQAP are mainly recorded via the comment history of the reviews in the TeamForge Document tool. Although these comments will be lost in the transition to the Atlassian tool suite, the assessment team felt that the succession of signed documents sufficiently demonstrates that the reviews took place.

The testing section (Section 7) of the SQAP, points to the *CASTLE Project – CASTLE-PX Software Verification and Validation Plan* (SVVP) and Section 8, Problem Reporting and Corrective Action, points to the *CASTLE-PX Software Configuration Management Plan* (SCMP). These documents are reviewed in later sections of this report. Section 9, Tools, Techniques and Methodologies, is covered in a separate *CASTLE Project – CASTLE-PX Software Acquisition Plan*. The SQA Officer self-identified that the Media Control, Supplier Control, and Records Collection sections (Sections 10, 11, and 12) need to be re-written to better follow the institutional templates. However, there was sufficient evidence in reviewing related documents and CASTLE-PX team interviews that the content of these sections were being adequately met. Project personnel training was verified via an LTRAIN course completion search. User training, other than instructions through the *CASTLE Project – CASTLE-PX User's Manual*, is outside the project scope. Section 5.4 of the *CASTLE Project - Software Management Plan* identifies project-related risks, while the *CASTLE Project – Software Safety Plan*, identifies risks related to the use of the software. The CASTLE-PX team demonstrated that a full risk grading (both the Risk Consequence and Process/Development Environment Risk Reports) had been completed. Finally, the SQA Officer self-identified that information on the retirement of the system needed to be added to the SQAP. The assessment team did not feel this omission was significant at this time, since older versions are replaced by updates and there are currently no plans to discontinue the CASTLE-PX application.

Deficiency:
[D-1] The Software Design Description document and changes are missing evidence of formal approval by the design organization.

Requirements Not Met:

- RID-0116, Requirement 3, Sub-section 100: The design shall be defined, controlled, and verified.
- RID-0116, Requirement 3, Sub-section 801: The software design process shall be documented, approved by the responsible design organization, and controlled. (Mapped to IEEE 730-2002, 4.4.2.1, Software Requirements Description (SRD) and 4.4.2.2, Software Design Description (SDD).
- RID-0116, Requirement 3, Sub-section 802.2: The change shall be formally evaluated and approved by the organization responsible for the original design, unless an alternate organization has been giving the authority to approve the changes. (Mapped to IEEE 828-2012, 9.2.2, Establish Change Evaluation Criteria and Authorities (CCB).
- RID-0117, Quality Criterion 4, a: Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

Actual / Potential Impact:

Evidence of formal review and approval of all design elements, whether initial design or changes occurring over the course of the application life cycle, indicates that the design has been reviewed and evaluated as adequately meeting customer needs and safety requirements. The necessity for this evidence, stated in requirements listed above, especially RID-0116, Requirement 3, Sub-section 801, and RID-0116, Requirement 3, Sub-section 802.2, indicate the review and approval must come from a representative of the design organization. Lack of this review and approval could indicate that design components and changes were made 1) without full evaluation and analysis of impact on the safe functioning of the application and/or 2) unintended changes were introduced into the design.

It is noted that many design elements are included in the *CASTLE Project – CASTLE-PX Requirements and Implementation Specification* document, which is formally reviewed and approved.

Observation:
[O-1] The description and diagram of the organizational structure /elements and responsibilities, as presented in Sections 3.1 and 3.3 of the SQAP do not show key designations (e.g., the design organization) nor indicate level of freedom or independence of evaluators.

Various requirements for software design, development, management, and evaluation require review and approval by specific organizations. For instance, review and approval of all design components and changes must be done by the design organization. By not specifying the design organization and its representative(s) in the organizational chart and descriptions, evaluating the adequacy of these efforts becomes unclear.

CR-2: SOFTWARE CONFIGURATION MANAGEMENT PLAN AND IMPLEMENTATION

Discussion of results

The *CASTLE-PX Software Configuration Management Plan* (will be referred to as the SCMP) generally met the institutional SCMP template and where it did not, the CASTLE-PX SQA Officer identified those gaps. There were only a few requirements in the document crosswalk that were not addressed, and these were documented in the crosswalk document by the assessment team as needing completion.

The assessment team observed through interviews with the CASTLE-PX Project Leader and SQA Officer that CASTLE-PX is transitioning from TeamForge, which has managed the CASTLE-PX daily software development and document configuration management activities since 2007, to Atlassian in June 2015 because LLNL announced that it would no longer support TeamForge. The Atlassian tools are fully supported by LLNL. In planning for this change, the CASTLE-PX Project Leader developed the *CASTLE TeamForge to Atlassian Migration Plan* that outlines how items are migrated from TeamForge to Atlassian. In addition, the Project Leader employs an Atlassian migration software checklist to keep track of software packages and sub-packages that need to be migrated and the completion of their migration. During assessment discussions, it was evident that all formal documents and significant records within the CASTLE-PX project will be migrated or archived. The only information that could not be transferred to Atlassian or archived was review comments, which the CASTLE-PX management did not deem significant to maintaining traceability or configuration management of the CASTLE-PX project documentation.

The CASTLE-PX SCMP adequately identifies all configuration items and fully describes how software changes are requested, submitted, and managed through release. Workflow descriptions, in the form of screen shots, for various TO DO Tracker Items provide detailed descriptions and promote confidence in the CASTLE-PX SCM process. The *CASTLE-PX Deployment Update Procedure* also aids and benefits the project team with instructions on how to generate new file releases, README file, release notes, the User's Manual, and post-Deployment tests.

Further described in the SCMP are the role and responsibilities of the CASTLE-PX Change Control Board (CCB) that evaluates change requests assigned to it in the TO DO tracker. Semi-monthly CCB meetings are held. Meeting minutes from these meetings were

reviewed during this assessment and found to appropriately record the attendance, discussions, and actions of the CCB.

The SCMP, Section 3.1, *Identifying Configuration Items*, describes how weapon response data, provided by the Design Agencies to the LLNL CASTLE-PX Technical Team, is configuration managed from the Weapon Response Code database, operated by the Sandia National Laboratories, in New Mexico, into CASTLE-PX. The SCMP points to *the CASTLE-PX Procedures – WRC Data Import*. This procedure was reviewed and found to adequately describe the import of weapon response data from the WRC into the CASTLE-PX.

The CASTLE-PX project manages the deployment and ongoing maintenance of the CASTLE-PX software system at the Pantex site through a memorandum of understanding (MOU). The assessment team reviewed the *Memorandum of Understanding (MOU) for the Deployment of the CASTLE-PX 2.*3, and noted that it adequately describes the roles and responsibilities of LLNL and the Pantex site for the ongoing operation and management of CASTLE-PX. The MOU describes how changes are requested through the CASTLE-PX CCB which has representation from both LLNL and Pantex. It also addresses deployment and user acceptance testing, and maintenance activities. A revised MOU is being written as an update which will reflect the new Managing and Operating contractor of the Pantex site, Consolidated Nuclear Security, LLC. The MOU is listed in the SCMP as a formal document which is identified by its title and the document ID assigned by TeamForge.

Deficiency:
[D-2] The issuance and approval of CASTLE-PX formal documents are not clearly identified.

Requirements Not Met:

- RID-0117, Quality Criterion 4, a: Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

Actual / Potential Impact:
Conflicting dates on formal documents cause uncertainty of their effective date and could lead to confusion over which documents are approved and able to be used by CASTLE-PX team personnel.

The CASTLE Project – CASTLE-PX Software Verification and Validation Plan's signature page did not contain the designation for what the signatures represented, in particular, Approval of the document, but listed only the names of the CASTLE-PX Project Leader and SQA Officer with their respective titles. The SQA Officer concurred on the *CASTLE Project – Software Project Management Plan* and the *CASTLE-PX Software Configuration Management Plan* after these two documents were approved by the Project Leader. The *CASTLE Project – CASTLE-PX Software Design Description* did not have an approval signature.

Observation:
[O-2] The CASTLE-PX document crosswalk is incomplete.

The crosswalk is an aid to the owners of safety software in the planning of work to implement the templates. Without a complete crosswalk, owners may miss addressing gaps in the SQA requirements of the LLNL SQA templates that need to be met in formal SQA documents. See Attachment 6 for additional details.

CR-3: SOFTWARE VERIFICATION AND VALIDATION
Discussion of results

The *CASTLE Project – CASTLE-PX Software Verification and Validation Plan* (will be referred to as the SVVP) used IEEE-1020-2004, *IEEE Standard for Software Verification and Validation*, as a guide for addressing the verification and validation (V&V) activities. The 2004 and 2012 versions of the IEEE standard are very different in that 2012 moved to a process approach, while the 2004 version had a document emphasis. Therefore the SVVP has significant differences relative to the institutional template that used the 2012 version. Particularly, the Test V&V sections of the institutional template are largely missing from the SVVP. This necessitated a much broader assessment approach to identify other project documents that addressed the necessary content.

Figure 2 of the SVVP depicts the full development life cycle using an interactive, spiral development approach. The V&V assessment started with that life cycle and its expectations for V&V activities. A day into the assessment it was noted that the project was actually in a maintenance phase and that Figure 2 did not represent the current life cycle being employed. A closer inspection and comparison with the life cycle diagram in the project SQAP showed that the SQAP did accurately depict a spiral life cycle based maintenance life cycle. This results in an observation to update the SVVP life cycle diagram.

The processes section of the SVVP presents the types of V&V activities grouped by Reviews, Walkthroughs and Deskchecks, and Testing. The institutional template is organized by specific V&V activities that employ the techniques described in the SVVP. The institutional template also emphasizes verification that the V&V activities were accomplished according to preset characteristics. This level of V&V was described during the assessment as the V&V of the V&V, which is performing process V&V of the product V&V activities.

The V&V of V&V framed a discussion of records. The project team provided significant objective evidence as demonstrated by Attachment 1. Not all objective evidence qualified as a record. This resulted in a discussion of what records were required. The CASTLE-PX team did specify in their SQAP the records they would keep along with their retention requirements. The testing records met the Computer Program Test Records content requirements of the institutional template.

The LLNL flow down of records requirements was reviewed. The institutional *Records Management Program* (DES-0206) flows down requirements from 36 CFR 12, 44 USC 3301, DOE O 243.1A and DOE O 243.2. This flow down is not prescriptive for specific records to be kept. The CASTLE-PX project did meet this level of flow down.

NAP-24 is specific to the Weapon Program and thus is not covered in the institutional flow down. NAP-24 does include wording for quality records, however NAP-24 was not included in the scope of the assessment.

The result of these reviews and assessment was an observation for the CASTLE-PX team to improve its identification and characterization of its records. It also resulted in a recommendation for LLNL to work with LFO to reach an agreed upon interpretation of the NAP-24 required records.

The interfaces with Pantex are managed via the formal Memorandum of Understanding (MOU), the Materials List, and by having at least one Pantex representative on the CCB.

The acquisition related V&V activities in the institutional template are focused mostly on initial development and will need customization for CASTLE-PX in the maintenance phase. The *CASTLE Project – CASTLE-PX Software Acquisition Plan* provides the results of the analysis and how acquisitions are managed.

The Hazard Analysis is accomplished through the FMEA (Failure Modes and Effects Analysis) for each safety requirement. Whenever a safety requirement is changed, the FMEA is reviewed and updated as needed.

The Security Analysis section of the institutional template may need customization due to the CASTLE-PX requirement (as noted in the *CASTLE Project – CASTLE-PX Requirements and Implementation Specification* [RIS]) to deploy using the Enterprise Secure Network (ESN). The customer's expectations for security are identified in the project MOU and the RIS.

Traceability is accomplished by use of the unique identifier for each requirement. For safety requirements, the requirement id is noted in the header documentation of the source code, which is verified during the required code walkthroughs of safety code when the code changes. Every code related TODO tracker is mapped to the associated requirements. Every code related TODO tracker is then mapped to TestLog test cases. The process ensures every change is tested. A special TeamForge tracker is created for each release. The Release tracker provides confirmation that every change is tested. This process was confirmed via work observation. Parts of it are documented in the *TestLog Usage Guide*. The SVVP would benefit from a concise description of how the Traceability Analysis is accomplished.

Requirements reviews are called out in the SVVP. The reviews and approvals of the RIS satisfy the requirements evaluation. The SVVP would benefit from addition description of how the requirements review satisfies the criteria specified in the SQAP.

Design reviews are called out in the SVVP. The RIS document does include parts of design and thus its review does serve as part of the design review. The *CASTLE Project – CASTLE-PX Software Design Description* includes a thorough description of the software architecture through various design views. It provides an effective roadmap for developers to navigate the software for development. The detailed design is captured in the source code documentation. As noted above, any change to safety related code is walked through. The elements of the design evaluation are found. The flow down of the template boilerplate will clarify the evaluation criteria. The SVVP will also need to include a description of how this design evaluation will be accomplished via the various activities and how the process ensures the evaluation criteria are employed.

The project has a procedure for loading data from WRC. It does not have a description of the specification for the files used to perform that import. The institutional template flows down the requirements to control interfaces and perform Interface Analysis. The project did identify the performance of Interface Analysis as a gap. It also recognized the need for an interface specification and started work prior to the assessment in developing the specification, which will be approved both by the CASTLE-PX project and the WRC development project. Because this was self-identified, it is categorized as an observation.

The Testing V&V sections of the institutional template were the least addressed in the SVVP. The project demonstrated strong testing performance through the work observations. The documentation of how the various Testing V&V activities were performed was embedded in the testing process that evolved within the project. The *TestLog Usage Guide* contains many attributes of a test plan and test procedure. The test cases are recorded in TestLog. The project is meeting and in some case exceeding (see strengths) testing performance requirements. For instance, regression testing always includes execution of all safety requirement related test cases. The project needs to clearly describe in the SVVP how the integrated testing is performed and how the execution is verified.

Processes are being performed; however the lack of description of how various activities are performed is a deficiency.

Deficiency:
[D-3] The descriptions of implemented processes are not documented.

Requirements Not Met:

- RID-0117, Quality Criterion 4, a: Prepare, review, approve, issue, use, and revise documents to prescribe processes, specify requirements, or establish design.

Actual / Potential Impact:
Without sufficient description of how processes are performed, those executing the process may omit important steps to perform or characteristics to consider. This reduces the effectiveness of the processes and possibly compromises quality.

The CASTLE-PX documents flowed down the requirements for executing processes such as reviews, audits, and transition through life cycle phases. The documents frequently identify who needed to participate. The criteria to be reviewed, evaluated, or audited were not specified in all cases. In only a few instances was there a description in how the review, audit, or life cycle transition was to be accomplished.

Observation:
[O-3] There is not a WRC interface specification document.

This was self-identified by the project team and action already started to complete an interface document. Up until this time, WRC created data load files according to the processes used in WRB. CASTLE-PX would perform a quality check on the files by attempting to load into a QA system. The CASTLE-PX team would then work with the appropriate WRC users to correct loading issues, such as the inclusion of '-'. This experience shows the important of clearly specifying interfaces.

Observation:
[O-4] The software life cycle diagram in the SVVP does not match the diagram in the SQAP.

The life cycle diagram in the SVVP includes the full development life cycle, rather than the software maintenance life cycle. It was multiple days into the assessment before this difference was identified. The unfortunate side affect was that time spent on some lines of inquiry were not needed. The SQAP does have the correct life cycle diagram.

Observation:
[O-5] Records identification and characterization needs improvement.

Significant objective evidence was presented. Obviously, not all objective evidence are records, for instance work observations. During the assessment of the V&V processes there was discussion on what records might be considered. The institutional flow down for records only explicitly lists a few record types that are required, such as testing records. These records focus primarily on measures of quality of the product, not the quality processes. Expectations for records are to be clearly identified in the SQAP and consideration given to when objective evidence of quality assurance activities should be recorded.

Recommendation:

[R-1] LLNL should review its interpretation of the NAP-24 records requirements in consultation with LFO and flow down adjustments as needed.

As an outgrowth of the records versus objective evidence discussion with the CASTLE-PX team, the LLNL flow down of the records requirements was reviewed. The flow down was found consistent with the DOE Records Management Order (DOE O 243.1A). It was noted that NAP-24 has additional guidance on records for quality assurance activities. The scope of required records was unclear. This is something that the LLNL Weapons Program and Livermore Field Office should discuss to determine a unified interpretation and flow that down to NAP-24 applicable activities. This is listed as a recommendation due to NAP-24 being out of scope of the assessment.

Strength:
[S-1] Use of a comprehensive release checklist provides assurance that required activities are completed.

Strength:
[S-2] Use of the TestLog tool centralizes and effectively organizes test cases and test results.

Strength:
[S-3] Conducting walkthroughs every time a safety requirement implementation is changed provides additional assurance for safety requirements.

Summary:

The CASTLE-PX software development effort was assessed for their flow down of the institutional 830 Software quality assurance requirements through three required document templates and their implementation of those SQA requirements.

The assessment was focused on the CASTLE-PX software development and release processes. It did not assess Pantex's acceptance or usage of the software. It also did not assess the flow down of NAP-24, *Weapon Quality Policy*, requirements.

The assessment resulted in:

Deficiencies	
D-1	The Software Design Description document and changes are missing evidence of formal approval by the design organization.
D-2	The issuance and approval of CASTLE-PX formal documents are not clearly identified.
D-3	The descriptions of implemented processes are not documented.
Observations	
O-1	The description and diagram of the organizational structure /elements and

	responsibilities, as presented in Sections 3.1 and 3.3 of the SQAP do not show key designations (e.g., the design organization) nor indicate level of freedom or independence of evaluators.
O-2	The CASTLE-PX document crosswalk is incomplete.
O-3	There is not a WRC interface specification document.
O-4	The software life cycle diagram in the SVVP does not match the diagram in the SQAP.
O-5	Records identification and characterization needs improvement.
Recommendation	
R-1	LLNL should review its interpretation of the NAP-24 records requirements in consultation with LFO and flow down adjustments as needed.
Strengths	
S-1	Use of a comprehensive release checklist provides assurance that required activities are completed.
S-2	Use of the TestLog tool centralizes and effectively organizes test cases and test results.
S-3	Conducting walkthroughs every time a safety requirement implementation is changed provides additional assurance for safety requirements.

Overall the CASTLE-PX team demonstrated it values quality and has worked to integrate quality practices into its software development processes. Improvement in documentation will enhance their SQA implementation.

Attachments:

Attachment 1: Documents Reviewed
Attachment 2: Persons Interviewed
Attachment 3: Work Observations
Attachment 4: CRADs
Attachment 5: Checklists
Attachment 6: Document Template Crosswalk Comments

Assessment Response Owner (*signifies the Assessment Response Owner has had the opportunity to review this Assessment Report for factual accuracy*)

Susan Taylor, Associate Program Director for Stockpile Support, NWEP — Date

Approvals:

Darrel Whitney, Lead Assessor — Date

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Attachment 1: Documents Reviewed

Document Identifier	Document Title	Revision and/or Date
230215-3101-40	Atlassian Migration – Document Checklist	
230215-1302-42	Atlassian Migration – Software Checklist	
LLNL-SM-420883-REV-13	CASTLE Project – CASTLE User's Manual	January 21, 2015
LLNL-SM-420822-REV-13	CASTLE Project – CASTLE-PX Material List	January 26, 2015
LLNL-SM-420834-REV-1	CASTLE Project – CASTLE-PX Requirements and Implementation Specification	January 30, 2015
LLNL-SM-424522-Rev-2	CASTLE Project – CASTLE-PX Software Acquisition Plan	October 29, 2014
LLNL-SM-420825-REV-5	CASTLE Project – CASTLE-PX Software Design Description (SDD)	January 29, 2015
LLNL-SM-420859-REV-6	CASTLE Project – CASTLE-PX Software Verification and Validation Plan	May 29, 2014
doc14643	CASTLE Project – Risk Registry	October 20, 2014
LLNL-MI-663680	CASTLE Project – Software Project Management Plan	October 22, 2014
LLNL-SM-411547-REV-8	CASTLE Project – Software Quality Assurance Plan	December 8, 2014
LLNL-SM-411594-REV-9	CASTLE Project – Software Safety Plan	January 26, 2015
	CASTLE TeamForge to Atlassian Migration Plan	February 23, 2015, version 59
	CASTLE-PX 2.8 Lancet Release Code Walkthrough Minutes	Multiple dates – latest being January 15, 2015
	CASTLE-PX Change Control Board Meeting Minutes	December 17, 2014
	CASTLE-PX Change Control Board Meeting Minutes	December 3, 2014
	CASTLE-PX Change Control Board Meeting Minutes	July 28, 2014
	CASTLE-PX Deployment Update Procedure (Draft)	February 2, 2015
	CASTLE-PX Developer's Guide	
	CASTLE-PX Document Template Crosswalk	
	CASTLE-PX FY15 Schedule and Budget	Version 5
LLNL-SM-412452-Rev-1	CASTLE-PX Oracle Database Conventions	October 28, 2014
	CASTLE-PX Overview – SQA Assessment	February 23 to March 6, 2015
LLNL-SM-452811-REV-4	CASTLE-PX Procedure – WRC Data Import	September 4, 2014
LLNL-TM-412247-REV-1	CASTLE-PX Project – Java Coding Conventions	October 29, 2014

Document Identifier	Document Title	Revision and/or Date
LLNL-SM-411625-REV-11	CASTLE-PX Software Configuration Management Plan	August 25, 2014
artf20618	Completed Release Checklist for Palisade release 2.7	
arft21173	Completed TODO tracker	
artf20761	Deployment instructions for Lancet release	Still open during assessment
artf20761	Deployment instructions for Palisade release	Closed October 9, 2014
	LLNL PRIDE Program Plan excerpt via e-mail from Barbara Campbell with Subject: Work Authorization and Traceability Analysis	March 3, 2015
CODT-2009-4390-REV-3 DE-NA0001942	Memorandum of Understanding for the Deployment of CASTLE-PX (Draft)	February 23, 2015
CODT-2009-4390-REV-2 DSW-10-56694-114-GM	Memorandum of Understanding for the Deployment of CASTLE-PX 2.3	December 12, 2012
post20447	RE: Review Needed: changes_v199.sql	January 5, 2015
	Readme File for CASTLE-PX Release: 2.8 Lancet – code version #: 2.8.6189.199	January 7, 2015
COR-TS-10/27/2009-208875 ITS Assessment 30088	Software Quality Assurance Assessment Report for the Lawrence Livermore National Laboratory CASTLE-PX Project	December 17, 2009
Attached to ITS # 35429.13.3	SQA Practices Implementation, FRM-3109 Rev. 1, for CASTLE-PX	November 17, 2014
	Test Log Test Cases 150113b.xlsx	
	TestLog Usage Guide	
artf21072	TODO tracker change request	
LLNL-AR-434732	Weapons and Complex Integration Management Self-Assessment Report, CASTLE-PX Project Software Configuration Management	June 9, 2010

Attachment 2: Persons Interviewed

Name	Title
Karen DeHoyos	CASTLE-PX Project Leader
Barbara Campbell	CASTLE-PX SQA Officer
Juan Hernandez	CASTLE-PX SQA

Attachment 3: Work Observations

Work Observed	Date field activity was observed
A demonstration of the TeamForge environment that highlighted the mechanism used for document comments and the Tracker system for tracking actions, specifically the TODO trackers.	February 23, 2015
An overview demonstration of the project testing process from TODO trackers to TestLog test cases to test results.	February 24, 2015
A detailed walkthrough of the testing process to observe objective evidence of each step of testing through project approval of the testing results.	February 26, 2015

Attachment 4: CRADs

CR-1: SOFTWARE QUALITY ASSURANCE PLAN AND IMPLEMENTATION

Objective:

Software project management and quality planning should depict the organizational structure that supports the software life cycle stages and deliverables, and influences and controls the quality of the software.

Criteria:

1. Software project management and quality planning has been completed and covers all requirements as flowed down via the institutional Software Quality Assurance Plan template.
2. The software project management and quality plans have been implemented in accordance with the plans.

Approach:

Use the CASTLE-PX Gap Analysis, template crosswalk, and institutional SQAP template to identify text in existing documents that address each requirement in the SQAP template. Assess the text for meeting the requirement. Identify expectations for evidence that the SQAP processes as described in existing documents have been implemented. Assess the evidence for implementation.

CR-2: SOFTWARE CONFIGURATION MANAGEMENT PLAN AND IMPLEMENTATION

Objective:

Software configuration is defined, maintained, and controlled until the software is retired.

Criteria:

1. Software configuration management planning has been completed and covers all requirements as flowed down via the institutional Software Configuration Management Plan template.
2. The software configuration management plans have been implemented in accordance with the plans.

Approach:

Use the CASTLE-PX Gap Analysis, template crosswalk, and institutional SCMP template to identify text in existing documents that address each requirement in the SCMP template. Assess the text for meeting the requirement. Identify expectations for evidence that the SCM processes as described in existing documents have been implemented. Assess the evidence for implementation.

CR-3: SOFTWARE VERIFICATION AND VALIDATION PLAN AND IMPLEMENTATION

Objective:

The software verification and validation process and related documentation are defined and maintained to ensure that (1) the software correctly performs all its intended functions; and that (2) the software does not perform any adverse unintended function.

Criteria:

1. Software verification and validation planning has been completed and covers all requirements as flowed down via the institutional Software Verification and Validation Plan template.
2. The software verification and validation plans have been implemented in accordance with the plans.

Approach:

Use the CASTLE-PX Gap Analysis, template crosswalk, and institutional SVVP template to identify text in existing documents that address each requirement in the SVVP template. Assess the text for meeting the requirement. Identify expectations for evidence that the SVVP processes as described in existing documents have been implemented. Assess the evidence for implementation.

Attachment 5: Checklists

These completed checklists ensured the scope of the assessment was covered. They only contain summary information. See other sections of the assessment report for additional details.

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
SQAP Template					
1.	Approvals	SQAP Approvals	Self-identified	Document is evidence	Self-identified
2.	Revision History	SQAP S1.2	Met	Document and TeamForge history	Met
3.	1. Purpose	SQAP S1, S1.1	Met See additional comments in Attachment 6	Document is evidence	See additional comments in Attachment 6
4.	2. Reference Documents	SQAP S2	Met See additional comments in Attachment 6	Document is evidence	See additional comments in Attachment 6
5.	3. Management	SQAP S3	Self-identified	Document is evidence	Met
6.	3.1 Organization	SQAP S3.1	Self-identified	Document, Organization Chart file, and SPMP	Self-identified Key designations are missing in the organization chart, as well as an indication of the evaluator independence See additional comments in Attachment 6
7.	3.2 Tasks	SQAP S3.2	Self-identified	Document and SPMP	Self-identified See additional comments in Attachment 6
8.	3.3 Roles and Responsibilities	SQAP S3.3	Met	Document is evidence	Met
9.	3.4 Quality Assurance Estimated Resources	SQAP S3.2	Met	Document, SPMP, Budget and Schedule file	Met See additional comments in Attachment 6
10.	4. Documentation	SQAP S4	Met	Document is evidence	Met

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
11.	4.2.1 Software Requirements Description	SQAP S4.2.3	Met	Document, SRD, and TeamForge history and TODO Trackers	Met See additional comments in Attachment 6
12.	4.2.2 Software Design Description	SQAP S4.2.5	Missing signature page	Document, SRD, SDD, and TeamForge history and TODO Trackers	Missing signature page See additional comments in Attachment 6
13.	4.2.3 Verification and Validation Plans (SVVP)	SQAP S4.2.7	Met	Document, SVVP, TeamForge history and test results, and TestLog	Met
14.	4.2.4 Verification Results Report and Validation Results Report	SQAP S4.2.7.2	Met	Document, SVVP, and TeamForge	Met See additional comments in Attachment 6
15.	4.2.5 User Documentation	SQAP S4.3.3	Met	Document and User Manual	Met See additional comments in Attachment 6
16.	4.2.6 Software Configuration Management Plan (SCMP)	SQAP S4.2.6	Met	Document, SCMP, and TeamForge	Met See additional comments in Attachment 6
17.	5. Standards, Practices, Conventions, and Metrics	(no content required by template)	Met	Document is evidence	Met
18.	5.1 Purpose		Self-identified	Document is evidence	Met See additional comments in Attachment 6
19.	5.2 Content		Self-identified	Document, Developer Guide, Java Coding Conventions, Database Conventions, and testing metrics	Self-identified See additional comments in Attachment 6
20.	6. Software Reviews	SQAP S6	Self-identified	Document is evidence	Met
21.	6.2 Minimum requirements	SQAP S6.2	Met	Document is evidence	Met
22.	6.2.1 Software Specifications Review	SQAP S6.2.3	Self-identified	Document, SRD versions, and TeamForge history	Met
23.	6.2.2 Architecture Design Review	SQAP S6.2.5	Met	Document, SRS versions, SDD versions, and TeamForge	Met
24.	6.2.3 Detailed Design Review	SQAP S6.2.6	Met	Document, SRS versions, SDD versions, and TeamForge	Met
25.	6.2.4 Verification and Validation Plan Review	SQAP S6.2.8	Met	Document, SVVP versions, and TeamForge history	Met
26.	6.2.5 Baseline Configuration Audit		Self-identified	Document, SCMP, Release Checklists, and TeamForge	Self-identified

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
27.	6.2.6 Functional Audit		Self-identified	Document, SCMP, Release Checklists, and TeamForge	Self-identified
28.	6.2.7 Physical Audit		Self-identified	Document, SCMP, Release Checklists, and TeamForge	Self-identified
29.	6.2.8 Managerial Reviews	SQAP S6.2.2	Met	Document and external and internal audits / assessments	Met
30.	6.2.9 Software Configuration Management Plan Review	SQAP S6.2.7	Met	Document, SCMP versions, and TeamForge history	Met
31.	7. Test	SQAP S7	Self-identified	Document is evidence	Met
32.	8. Problem Reporting and Corrective Action	SQAP S8	Self-identified	Document, SCMP, CCB Meeting Minutes, and TeamForge TODO Trackers	Met
33.	9. Tools, Techniques, and Methodologies	SQAP S9 Template Table 4 is in SAP.	Self-identified	Document and Acquisition Plan	Met See additional comments in Attachment 6
34.	10. Media Control	SQAP S10	Self-identified	Document, SCMP, Deployment Procedure, and TeamForge Source Code and File Release	Self-identified
35.	11. Supplier Control	SQAP S11	Self-identified	Document and Acquisition Plan	Met
36.	12. Records Collection, Maintenance, and Retention	SQAP S12	Met	Document and TeamForge	Met See additional comments in Attachment 6
37.	13. Training	SQAP S13	Self-identified	Document, LTRAIN completion records, User Manual, and MOU	Met See additional comments in Attachment 6
38.	14. Risk Management	SQAP S14	Self-identified	Document, Risk Grading Tool CASTLE-PX record, and Risk Management Plan	Met See additional comments in Attachment 6
39.	15. Glossary	SQAP S15	Met	Document is evidence	Met
40.	16. SQAP Change Procedure and History	SQAP S16	Self-identified	Document and TeamForge history	Met
41.	17. Software Application Retirement		Self-identified		Self-identified
SCMP Template					
42.	Approvals	SCMP Approvals	Self-Identified.	Document is evidence	Self-Identified. See additional comments in Attachment 6
43.	Revision History	SCMP S1.6	Met	Document is evidence	Self-Identified

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
44.	1. Introduction	SCMP S1	Met	Document is evidence	See additional comments in Attachment 6
45.	1.1 Intended Audience	SCMP S1.1	Met	Document is evidence	Met
46.	1.2 Overview and Scope	SCMP S1.2	Met	Document is evidence	See additional comments in Attachment 6
47.	2. References	SCMP S1.3 (points to S9)	Self-Identified.	Document is evidence	Self-Identified. See additional comments in Attachment 6
48.	3. SCM Management	SCMP S2	Met	Document is evidence	Self-identified
49.	3.1 Organization	SCMP S2.1	See additional comments in Attachment 6	Document, Organization Chart file, SQAP and SPMP	See additional comments in Attachment 6
50.	3.2 SCM Responsibilities	SCMP S2.2	Self-Identified.	Document is evidence, MOU	Self-Identified
51.	3.3 Applicable Policies, Directives, and Procedures	SCMP S2.3	Met	Document is evidence; SQAP	Met
52.	3.4 Management of the SCM Process	SCMP S2.4	Self-Identified.	Document is evidence, MOU, CCB	Self-Identified. See additional comments in Attachment 6
53.	3.5 SCM Schedules	SCMP S4 Diagrams in 3.2.1 and 3.2.4	Self-Identified.	Document is evidence	Self-Identified. See additional comments in Attachment 6
54.	3.6 SCM Resources	SCMP S5	Self-Identified.	Document is evidence, CCB	Self-Identified. See additional comments in Attachment 6
55.	4. SCM Activities	SCMP S3	Met	Document is evidence, TeamForge, MOU, CCB	Met
56.	4.1 Configuration Identification	SCMP S3.1	Met	Document is evidence	Met
57.	4.1.1 Identifying Configuration Items	SCMP S3.1.1	See additional comments in Attachment 6	Document is evidence, Team Forge	See additional comments in Attachment 6
58.	4.1.2 Naming Configuration Items	SCMP S3.1.2	Met	Document is evidence	Met
59.	4.1.3 Acquiring Configuration Items	SCMP S3.1.3	Self-Identified.	Document is evidence,	Self-Identified
60.	4.1.4 Establishing Configuration Baselines		Self-Identified.	Document is evidence	Self-Identified
61.	4.2 Configuration Change Control	SCMP S3.2	Self-Identified.	Document is evidence, MOU, CCB	Self-Identified. See additional comments in Attachment 6

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
62.	4.2.1 Requesting Changes	SCMP S3.2.1 (and maybe 3.2.6)	Self-Identified.	Document is evidence.	Self-identified. See additional comments in Attachment 6
63.	4.2.2 Evaluating Changes	SCMP S3.2.2	Self-Identified.	Document is evidence. CCB	Self-identified. See additional comments in Attachment 6
64.	4.2.3 Approving or Disapproving Changes	SCMP S3.2.3	Met	Document is evidence, CCB	Met
65.	4.2.4 Implementing Changes	SCMP S3.2.4		Document is evidence	See additional comments in Attachment 6
66.	4.3 Configuration Status Accounting	SCMP S3.3	Self-Identified.	Document is evidence.	Self-Identified. See additional comments in Attachment 6
67.	4.4 Configuration Auditing	SCMP S3.4	Self-Identified.	Document is evidence, release checklists and TeamForge	Self-identified. See additional comments in Attachment 6
68.	4.4.1 Baseline Configuration Audit	Release checklist	See additional comments in Attachment 6	Document is evidence, release checklists and TeamForge	See additional comments in Attachment 6
69.	4.4.2 Functional Configuration Audit	Release checklist	Met	Document is evidence, release checklists and TeamForge	Met
70.	4.4.3 Physical Configuration Audit	Release checklist	Met	Document is evidence, release checklists, and TeamForge	Met
71.	4.5 Supplier Configuration Item Control	SCMP S3.6 & SAP	Self-Identified.	Document is evidence.	Self-Identified
72.	4.6 Release Management	SCMP S3.7	Met	Document is evidence, release checklists, and TODO trackers	Met
73.	5. Definitions and Acronyms	SCMP S8	Met	Document is evidence	Met
74.	6. SCM Plan Maintenance	SCMP S7	Met	Document is evidence	Self-Identified
SVVP Template					
75.	Cover Page	Cover Page	See additional comments in Attachment 6	Document is evidence	See additional comments in Attachment 6
76.	Disclaimer	Disclaimer Page	Met	Document is evidence	Met
77.	Approvals	SVVP Approvals	Self-identified See additional comments in Attachment 6	Document is evidence	See additional comments in Attachment 6

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
78.	Revision History	Points to TF	Met	TeamForge list of comments	See additional comments in Attachment 6
79.	TOC	TOC	Met	Document is evidence	Met
80.	1. Purpose & Scope	SVVP S1	Self-identified	Document is evidence	See additional comments in Attachment 6
81.	2. References	SVVP S2	Self-identified	Document is evidence	See additional comments in Attachment 6
82.	3. Definitions	SVVP S3	Met	Document is evidence	Met
83.	4. V&V Overview	SVVP S4	Met	Document is evidence	Met
84.	4.1 Organization	SVVP S4.1 (S4.5)	Self-identified	Document and Project Organization chart	Met
85.	4.2 Master Schedule	SVVP S4.2 and Figure 2	Self-identified	Document and SPMP, Project Schedule and Budget spreadsheet, MOU	See additional comments in Attachment 6
86.	4.3 Resources Summary	SVVP S4	See additional comments in Attachment 6	Project Schedule and Budget spreadsheet	See additional comments in Attachment 6
87.	4.4 Responsibilities	SVVP S4	Self-identified	Document is evidence	See additional comments in Attachment 6
88.	4.5 Tools, Techniques and Methods	SVVP S5.x.2	Self-identified	Document and SAP	See additional comments in Attachment 6
89.	4.6 Computer Program Test Records	SVVP S6 and 5.3.4 sections	Self-identified	Document and test records	Met
90.	5. V&V Processes	SVVP S5	Met	Document is evidence	Met
91.	5.1 Common V&V Processes		Self-identified	Document is evidence	Met
92.	5.1.1 Interface With Other Processes	WRC Data Import Procedure	Self-identified See additional comments in Attachment 6	MOU, CCB Minutes, CCB description in SCMP, Material List	Met
93.	5.1.2 Acquisition System Requirements Review		Self-identified	SAP, Material List	Met
94.	5.1.3 Acquired Software Evaluation		Self-identified	SAP	See additional comments in Attachment 6
95.	5.2 Software V&V Processes		Self-identified	Problem reporting process in SQAP, Change control process in SCMP, TODO trackers	Met
96.	5.2.1 Hazard Analysis	SSP	Self-identified	FMEAs	Met
97.	5.2.2 Security Analysis		Self-identified	MOU, RIS for network deployment requirements	Met See additional comments in Attachment 6

Item No.	Requirement	CASTLE-PX Document	Assessment of Requirement Flow Down	Expectations for Implementation Evidence	Assessment of Implementation Evidence
98.	5.2.3 Traceability Analysis	SSP S3.7	See additional comments in Attachment 6	TODO, Release Checklist, Code Walkthrough	See additional comments in Attachment 6
99.	5.2.4 Software Requirements Evaluation	SVVP S5.1.1	See additional comments in Attachment 6	RIS review and approval comments	See additional comments in Attachment 6
100.	5.2.5 Software Design V&V		Self-identified	Document is evidence	Met
101.	5.2.5.1 Design Evaluation	SVVP S5.1.1	See additional comments in Attachment 6	RIS review and approval comments, SDD review comments, Code Walkthrough	See additional comments in Attachment 6
102.	5.2.5.2 Interface Analysis		Self-identified	Document is evidence	The draft WCR interface specification needs to be completed.
103.	5.2.6 Software Construction V&V		Self-identified	Document is evidence	Met
104.	5.2.6.1 Source Code & Source Code Documentation Evaluation	SVVP S5.2	Met	Code Walkthrough	Met
105.	5.2.7 Software Test V&V	SVVP S5.3	Self-identified	Document is evidence	Met
106.	5.2.7.1 Software Test Plan V&V		Self-identified	TestLog Usage Guide	Met See additional comments in Attachment 6
107.	5.2.7.2 Software Test Design V&V		Self-identified	FMEAs mitigations, Test Cases	See additional comments in Attachment 6
108.	5.2.7.3 Software Test Procedure V&V		Self-identified	SSP, Test Cases, TestLog Usage Guide	See additional comments in Attachment 6
109.	5.2.7.4 Software Test Execution		Self-identified	TestLog records	Met
110.	5.2.7.5 Software Test Execution V&V		Self-identified	Release Checklist, Deployment TODO, SSP, TestLog, TestLog Report, TODO trackers	See additional comments in Attachment 6
111.	5.2.8 Software Installation & Checkout V&V		Self-identified	Readme files, Deployment Update Procedure	See additional comments in Attachment 6
112.	5.2.9 Software Operation V&V		Self-identified	(Production operations owned by Pantex)	See additional comments in Attachment 6
113.	5.2.10 Software Maintenance V&V		Self-identified	Document is evidence	Met
114.	5.2.10.1 Task Iteration		Self-identified	SSP, TestLog Usage Guide	See additional comments in Attachment 6
115.	6. SVV Plan Maintenance		Self-identified	SVVP review and approval comments	Met

Attachment 6: Document Template Crosswalk Comments

The first three columns are the original template crosswalk performed by the CASTLE-PX project team. The assessment team noted additional information that may impact the effort required to complete the conversion to the templates. These are listed in the fourth column.

The assumption for all additional comments is that the "black" text from the templates will be used as is. The additional comments address the blue text in the template and potential changes to the current CASTLE-PX document content.

SQAP Template versus Current SQAP

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
Cover Page	Meets template		
Disclaimer	Meets template		
Approvals	Information is the same. Roles are not specified for signatures	Header and footer information is there, but not in the correct place. Header and footer needs to be re-arranged. Need to add roles for signatures (e.g. Prepared by: and Approved by:)	Signature dates should pre-date or be the same as the cover page/effectiveness date. The current footer/headers may be used provided an equivalency is documented with the required template.
Revision History	Section 1.2	Move section 1.2 to Revision History page	
	Preface		Move to "Purpose" section (1.0)
1.0 Purpose	1.0 Purpose 1.1 Scope		Reconsider first paragraph/Note. Remove if not needed. List CASTLE "products", if any.

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
2.0 Reference Documents	There is just a list of the required documents.	Documents need to be grouped to meet the template.	Add organizational QA documents to which this is subordinate (e.g., Weapons Program QAP and WCI QAP) Move governance documents from 1.0 to 2.0. Add institutional procedures and additional CASTLE documents referenced by the SQAP. Add boiler plate.
3.0 Management		Need to add boiler plate	
3.1 Organization	3.1 Points to org chart in TF	Need to re-do org chart to meet guidelines of template. Need to add some boiler plate	Add verbiage for organizational freedom of testers. Call out design organization.
3.2 Tasks	3.2 SQA Tasks	Add table	Add descriptions and exit criteria for life cycle phases/tasks.
3.3 Roles and responsibilities	3.3 Responsibilities	Change section title	Identify the design organization representative
3.4 Quality assurance estimated resources	3.2 points to the project plan	Move words from 3.2 to 3.4	Point to the schedule / budget document
4 Documentation			Add boiler plate
4.1 Purpose	4.1		Add boiler plate
4.2 Minimum documentation requirements	4.2	Add clarification regarding the CM of the documents	Add boiler plate
	4.2.1 Project management documentation	Move to 4.3	
	4.2.2 Risk Management Plan	Move to 4.3	
4.2.1 SRD	4.2.3 SRD		Reference CASTLE-PX SRS document, not IEEE standard

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
	4.2.4 Software Safety Plan	Move to 4.3	
4.2.2 SDD	4.2.5 SDD		Missing Signature page and signature of design organization representative. List attributes captured in SDD. Reference CASTLE-PX SDD (and SRS), not IEEE standard.
4.2.3 V&V Plans	4.2.7 V&V Documentation		Add boiler plate
4.2.4 Verification results Report and Validation results report	4.2.7.2		Point to location of results files
4.2.5 User Documentation	4.3.3 User Documentation		Reference CASTLE-PX User Manual, not IEEE standard. List other user documentation here or in section 4.3 (e.g., Readme files, Materials List, Maintenance documentation, etc.).
4.2.6 SCMP	4.2.6 SCMP		Reference CASTLE-PX SCMP, not IEEE standard. Add boiler plate, including list of high-level CIs.
4.3 Other Documentation		*Move 4.2.1, 4.2.2, 4.2.4 to this section (see above)*	Add boiler plate and list other documents.
	4.3.1 Scope management plan	Delete.	
	4.3.2 Maintenance Documentation	Delete.	Delete, leave here, or move to Section 4.2.5 as an additional user reference document.
	4.3.3 User Documentation	*Move to 4.2.5 (see above)*	

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
5 Standards, practices, conventions and metrics			
5.1 Purpose	Developers Guide, Coding Conventions, Database Conventions		Add boiler plate. List documents referenced in column 2 in Section 5.2.
5.2 Content		Add this section	Add boiler plate.
	5.2 Metrics	Can we delete this?	No. Describe data sources most frequently used and sample types of metrics you might check.
6 Software Reviews		Add boiler plate	
6.1 Purpose	6.1 Purpose		
6.2 Minimum requirements	6.2 Minimum Requirements		
	6.2.1 Quarterly Project Reviews	Move or delete	Delete or move to Section 6.2.8, Managerial Reviews.
	6.2.2 Software Quality Assurance Audit	Move.	Move to Section 6.2.8, Managerial Reviews.
6.2.1 Software specifications review	6.2.3 Software Requirements Review	Add boiler plate and move	
	6.2.4 Software Safety Plan Review	Move to 6.3 Other	
6.2.2 Architecture Design Review	6.2.5 Conceptual Design Review	Move and retitle	
6.2.3 Detailed design review	6.2.6 detailed design review	Move. May add reference to V&V Plan	
	6.2.7 Configuration Management Review	Move to 6.2.9	
6.2.4 V&V Plan review	6.2.8 V&V Plan review	Move.	
	6.2.9 In-process reviews	Move to 6.3	
	6.2.10 Code Walkthroughs	Move to 6.3	
6.2.5 Baseline configuration audit		Add section. And pointer to the SCMP, section 3.3	

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
6.2.6 Functional Audit		Add section. Add pointer to SCMP, section 3.3?	
6.2.7 Physical audit		Add section. Add pointer to SCMP, section 3.3	
6.2.8 Managerial Reviews	6.2.2	*(see above)*	
6.2.9 Software configuration management plan review	6.2.7	*(see above)*	
6.3 Other reviews and audits	6.3 Other reviews and audits		
7 Test	7 Test	Update using boiler plate	
8 Problem reporting and corrective action	8 Problem Reporting and correction action	Update using boiler plate	
9 Tools, techniques and methodologies	9 tools, techniques and methodologies	Add reference to the software acquisition document. Note: Table 4 in template is a table in the SAP.	Also add information on techniques and methods used.
10 Media control	10 Media control	Requires complete re-write	
11 Supplier control	11 Supplier control	Add boiler plate	
12 records collection, maintenance and retention	12 records collection, maintenance and retention	Does this need to be re-written?	Yes. Follow the template and add additional information as needed. This may be a good place to clarify the difference between objective evidence and records. During the assessment, evidence was provided that processes were met. Not all of the evidence met the criteria of a record.

SQAP Template	Current CASTLE-PX SQAP	Self-Identified Gap	Additional Comments
13 Training	13 Training	Add boiler plate	Reference LTRAIN for CA0750-W and EC4063 (now CA0760). Point to Training section of MOU for user training.
14 Risk Management	14 Risk Management	Update to point to correct section(s) per section movement above.	Reference CASTLE-PX Risk Management Plan. Add boiler plate regarding PDE Score.
15 Glossary	15 Glossary and Acronyms	Change title of section	Updated as needed.
16 SQAP change procedure and history	16 SQAP change procedure and history	Update to meet boiler plate	
17 Software application retirement		Add this section	
Appendix A Detailed tool information	SAP	?	Optional template. Can delete.
	Appendix A Software quality practices mapped to CASTLE	delete	
Appendix B Identified software effort development risks			Optional template. Can delete.
	Appendix B Risk Grading for CASTLE-PX	Delete	

SCMP Template versus Current SCMP

SCMP Template	Current CASTLE-PX SCMP	Self-Identified Gap	Additional Comments
Title page & disclaimer	Content is there		
Approval page	Have approved & concur Header & footer info is there, but not in the same places as the template	Does this need to be changed? Move the header and footer info to match the template	Delete concurrence signature and replace with approval signature
Revision History page	Section 1.6	Move section 1.6	
Table of Contents Tables Figures	Table of Contents Figures Tables	Do we need to change the order of the Figures and Tables?	Change to be consistent with template
1 Introduction	1 Introduction	Update to boiler plate; content is the same	Last statement may be misinterpreted. Consider deleting
1.1 Intended Audience	1.1 Intended Audience	Update to boiler plate; content is the same	
1.2 Overview and Scope	1.2 Project Overview & Scope		Consider deleting “approximate” and state actual team membership number
2 References	1.3 References (points to section 9)	Update section 9 to group references by Regs, Stds, and project docs	Add DOE O 200.1A and DOE O 414.1D Admin Chg 1 to be consistent with template. Add additional SQA documents to be consistent with template.
	1.4 Definitions and Acronyms points to section 8 of current document	Move to section 5 (see below)	
	1.5 Layout of this document	Would like to keep this section and re-write to point to the LLNL SCMP template	

SCMP Template	Current CASTLE-PX SCMP	Self-Identified Gap	Additional Comments
	1.6 Revision History	Move to precede the TOC (see above)	Remove reference to TeamForge and replace with Atlassian. This reference change needs to be reflected throughout SCMP
3.0 SCM management	2 SCM Management	Align section numbering	
3.1 Organization (points to SQAP)	2.1 Organization (points to TF)		Organizational chart needs updating. See SQAP comments
3.2 SCM responsibilities	2.2 SCM Responsibilities	Add boiler plate; Review Table in template compared to CASTLE-PX table and align the CASTLE-PX table with the table in the template.	
3.3 Applicable policies, directives and procedures	2.3 Applicable policies, directives and procedures		Points to SQAP
3.4 Management of the SCM process	2.4 Management of the SCM Process	Need to assess whether to update to template boiler plate or keep as is (which is more descriptive of the CASTLE-PX project)	Include the template boilerplate, which flows down consensus standard requirements, then add additional descriptive text as needed for the project. Make sure it reflects activities and responsible individuals. Measures need to be added to this section as a way to monitor performance (see SQAP)
3.5 SCM schedules	4 SCM schedules	Move. Also diagrams in section 3.2.1, 3.2.4; do we need to add a Table 2?	Need to add a table 2 to be consistent with template
3.6 SCM resources	5 SCM Resources	Move. Consider adding a Table 3.	Need to add a Table 3 to be consistent with template
4 SCM Activities	3 SCM Activities		Requirements located in section 3.1 and 3.1.1
4.1 Configuration identification	3.1 Configuration Identification		

SCMP Template	Current CASTLE-PX SCMP	Self-Identified Gap	Additional Comments
4.1.1 Identifying Configuration Items	3.1.1 Identifying Configuration items	CASTLE-PX has more detailed information than the template requires.	SDD listed as configuration item but not approved. Needs to be a formal, signed, approved document
4.1.2 Naming Configuration Items	3.1.2 Naming Configuration Items		
4.1.3 Acquiring Configuration Items	3.1.3 Acquiring Configuration Items	Section needs to be expanded to describe how ALL items identified in 3.1.1 are first placed in the CM tool.	
4.1.4 Establishing configuration baselines		Need to add this section.	
4.2 Configuration Change Control	3.2 Configuration Control	Add boiler plate	Add “End User Support” description in MOU
4.2.1 Requesting changes	3.2.1 Requesting Software changes	Need to review template list in detail and compare CASTLE-PX TODO tracker items to make sure we are meeting the requirements.	Consider changing first sentence and deleting “anyone” and add PX team as requestors of changes
4.2.2 Evaluation changes	3.2.2 Evaluating changes	May want to rearrange or clarify that some of this info is in the 3.2.1 section.	Consider rearranging content to align with template
4.2.3 Approving or disapproving changes	3.2.3 Approving or disapproving changes	CASTLE-PX has more info (e.g. Table 5) than the template requires	
4.2.4 Implementing changes	3.2.4 Implementing Changes		
	3.2.5 Configuration management of documents		See comments in template section 4.1.1 above.
	3.2.6 Traceability	May want to move this to Requesting Changes to better align with the template.	Consider moving this section to better align with template

SCMP Template	Current CASTLE-PX SCMP	Self-Identified Gap	Additional Comments
4.3 configuration status accounting	3.3 configuration status accounting	Add that the configuration status accounting is available on demand and is performed as part of each release process.	The “how” this requirement is met is missing and needs to be described in the SCMP
4.4 Configuration auditing	3.4 configuration evaluation and reviews	Add boiler plate.	Consider adding more description of how these requirements are met
4.4.1 Baseline configuration audit	Release Checklist does this	Move release checklist to this section or point to the release checklist from this section	Consider moving release checklist to this section
4.4.2 functional configuration audit	Release Checklist	Same as above	
4.4.3 physical configuration audit	See the release checklist		Release checklist satisfies this requirement
4.4.4 other configuration audits			
	3.5 Interface Control	Not required by the template. We may want to move this to an appendix.	Address this in the SVVP
4.5 Supplier configuration item control	3.6 Subcontractor/Vendor Control The template information is addressed in the Software Acquisition Plan	The CASTLE-PX section as written is not required. Add section and point to the Software Acquisition Plan	
4.6 Release Management	3.7 Release Management and delivery		
4.7 Disaster recovery	6 Disaster Recovery	Do we need to update the last paragraph in our section? “Backup and recovery of the production data on a deployed application is described in user procedures at the site where the application is being used; initially, this is Pantex.”	Please consider updating this section to include Pantex user procedures

SCMP Template	Current CASTLE-PX SCMP	Self-Identified Gap	Additional Comments
5 Definitions and Acronyms	8 Definitions and acronyms		
6 SCM Plan maintenance	7 SCM Plan Maintenance	Add pointer to history of the document	
Appendix A Configuration Change Control Members	Addressed in section 3.2.3		

SVVP Template versus Current SVVP

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
Cover page	Meets template		Clarify that the date is issue/effective date
Disclaimer	Meets template		
Approvals	Information is the same Roles are not specified for signatures.	Header and footer information is there, but not in the correct place. Header and footer ned to be re-arranged. Need to add roles for signatures (e.g. Prepared by: and Approved by:, etc)	The current footer/headers may be used provided an equivalency is documented with the required template. Clarify meaning of dates and sequence of assignment.
Revision History	Points to TeamForge		Document that after migration the changes to legacy documents will be determined through document compares.
TOC	TOC	TBD	
1.0 Purpose & Scope	1.0 Introduction	Add boiler plate from template; Move the list of activities to section 4.5;	Remain focused on the purpose for which the software was specifically designed for and its actual users.
2.0 References	2.0 References	Documents need to be grouped to meet the template	Start with the complete list from the template and add CASTLE-PX/NWEP specific documents.
3.0 Definitions	3.0 Definitions, Abbreviations,	Do we need to change the title?	The title may be kept provided

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
	and Acronyms		an equivalency to the template is documented. Update Appendix A as needed.
4.0 V&V Overview	4.0 V&V Overview	Move Figure 2 and description to 4.2	Figure 1 might fit better in Section 1.0
4.1 Organization	4.1 Organization	Replace current section with boiler plate pointing to the Project Org Chart	
	4.1.1 V&V Independence	Consider deleting?	The question of independence will come up. That should be addressed in the SQAP under the Management section. This content could also be move to 4.4 of the SVVP.
	4.1.2 Relationship to Other Processes	Consider deleting?	Use to address SVVP 4.2.
	4.1.3 Issue Resolution Authority	Consider deleting?	Address in SVVP 4.4
	4.1.4 Authority for approving V&V Products	Consider deleting?	Address in SVVP 4.4
4.2 Master schedule	4.2 Master Schedule	Add Figure 2 and description here. Keep the current information in the CASTLE-PX section.	Point to schedule and budget with note that this project is in maintenance. Consider pointing to the life-cycle in the SQAP to ensure consistency.
	4.3 Software Levels	Consider removing this section (or move it)	Delete.
4.3 Resources Summary	4.4 Resources summary	Move CASTLE-PX 4.4 to 4.3	Make sure appropriate parts of blue text are addressed.
4.4 Responsibilities	4.5 Responsibilities	Expand CASTLE-PX Table 1 to address all items in template	Note that due to the project being in the maintenance phase

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
		table 2. Move Org chart sentence to section 4.1	that the activities are tailored for that phase and to see the corresponding sections of the SVVP for that tailoring.
4.5 Tools, Techniques and Methods	5.x.2	Need to reorganize CASTLE-PX document; take all of the 5.x.2 sections and move to 4.5 in an organized fashion. We may want to put subsections in here.	5.2.2 contains description consistent with the template. Table 2 from section 5.0 is a good start. Make sure appropriate parts of blue text are addressed.
4.6 Computer Program Test Records	6.0 V&V Reporting Requirements And 5.3.4 sections	Move 6.0 to 4.6 and update to meet template format. Also, 5.3.4 contains some of this information.	Section 4.6 of the template is a flow down of NQA-1 requirements on the content specific to test records. Use the template "black" text as is and add any additional attributed that CASTLE-PX is collecting. Note that the In-use tests are performed at Pantex by Pantex. The subject of records is distributed in the SVVP and covered in the individual V&V sections. The list of records to be produced and maintained is covered in the SQAP Section 12. Consider moving content from the table in CASTLE-PX SVVP Section 6.1 to the SQAP.
5.0 V&V Processes	5.0 V&V Processes	Move Table 2 and info to section 4.5	
5.1 Common V&V Processes		Replace with boiler plate	
5.1.1 Interface with other	WRC Data Import Procedure	Replace current section with	This is about organizational

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
processes		information regarding how CASTLE-PX interfaces with WRC and point to the WRC Data Import Procedure	interfaces and is mostly covered in the MOU. Think about how those interactions are controlled.
5.1.2 Acquisition System Requirements Review		Need to add.	Consider how the SAP addresses this.
5.1.3 Acquired software Evaluation		This section needs to be added	Consider how the SAP addresses this and what customization is needed.
5.2 Software V&V Processes		Add boiler plate	
5.2.1 Hazard Analysis	Software Safety Plan	Add boiler plate Add pointer to SSP	Consider the content in the following sections of the current SSP: S4-S4.7, S5.3, and S5.4. Include how FMEAs are maintained.
5.2.2 Security Analysis		Need to add	May need customization to take credit for ESN deployment.
5.2.3 Traceability Analysis	Software Safety Plan S3.7	Add pointer	Include description of how it is done and what the evidence is that it was done.
5.2.4 Software Requirements Evaluation	5.1.1 V&V Tasks – Technical Reviews	Currently this section covers more than just requirements review. So, pare it down to cover just the requirements review.	See SQAP for attributes for the evaluation. Consider how to customize this for a maintenance life-cycle. Describe how the evaluation is performed.
5.2.5 Software Design V&V		Add boiler plate	
5.2.5.1 Design Evaluation	5.1.1 V&V Tasks – Technical Reviews	Pull out information describing database and design reviews.	
5.2.5.2 Interface Analysis		Need to add this section	
5.2.6 Software Construction V&V		Add boiler plate	
5.2.6.1 Source Code & Source Code Documentation Evaluation	5.2	Move 5.2 to here.	Either point to SSP for special safety code requirements or

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
			include here. Consider a check list for attributes to be evaluated.
5.2.7 Software Test V&V	5.3	Add boiler plate. Move 5.3 to here.	
5.2.7.1 Software Test Plan V&V		Add boiler plate and section	Include a description of the integrated testing process in the context of using TestLog as the test plan and consider using the review of the SVVP as the test plan V&V.
5.2.7.2 Software Test Design V&V		Add boiler plate and section	Include description of how the test designs are reviewed.
5.2.7.3 Software Test Procedure V&V		Add boiler plate and section	Consider reformatting the TestLog Usage Guide to better represent a test procedure. Include description of how the test procedure/cases are reviewed.
5.2.7.4 Software Test Execution		Add boiler plate	
5.2.7.5 Software Test Execution V&V		Add boiler plate and section	Pull together the information from the various documents to explain how the process employed satisfies this V&V.
5.2.8 Software Installation & Checkout V&V		Add boiler plate and section	Customize for the fact that LLNL does not perform the installations, but rather provides the instructions and guidance for performing the installations.
5.2.9 Software Operation V&V		Add boiler plate and section	Customize for the fact that Pantex owns production operations.
5.2.10 Software Maintenance		Add boiler plate and section	

SVVP Template	Current CASTLE-PX SVVP	Self-Identified Gap	Additional Comments
V&V			
5.2.10.1 Task Iteration		Add boiler plate and section	Move into this section information about regression testing and what is included.
6.0 SVV Plan Maintenance		Add boiler plate and section	
General Comments			Tables 5.1.7, 5.2.7, and 5.3.7 could be used to support the SQAP Risks Management section.