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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Bellefonte Nuclear Plant, Units 1 and 2
Construction Permit Nos. CPPR-122 and CPPR-123
NRC Docket Nos. 50-438 and 50-439

Subject: **REVISED BELLEFONTE QUALITY VERIFICATION PROGRAM**

References:
1. Letter from TVA to NRC, "Bellefonte Nuclear Plant (BLN) Units 1 (CPPR-122) and 2 (CPPR-123) - Quality Verification Program," dated April 1, 2011 [ML110980306].
2. Letter from TVA to NRC, "Bellefonte Nuclear Plant (BLN) Units 1 (CPPR-122) and 2 (CPPR-123) – Key Regulatory Assumptions for the Possible Completion of Construction Activities," dated April 9, 2010 [ML101050030].

The purpose of this letter is to provide the Tennessee Valley Authority's (TVA) revised Bellefonte (BLN) Quality Verification Program (QVP) for the Nuclear Regulatory Commission's (NRC) review and approval.

TVA initially submitted the QVP to the NRC by letter dated April 1, 2011 (Reference 1). Subsequent discussions with NRC staff as well as the development and implementation of site procedures and processes since that submittal have created the need for TVA to revise the QVP submittal to provide additional detail on the individual program elements and describe how those elements align with approved site procedures.

As described in TVA's letter dated April 9, 2010 (Reference 2) regarding the key regulatory assumptions for the possible completion of BLN construction activities, TVA suspended the Nuclear Quality Assurance Program (QAP) at BLN and removed some plant equipment during this period under a commercially controlled investment recovery (IR) program. This suspension remained in effect until March 2009, when TVA submitted Revision 20 of the TVA Nuclear Quality Assurance Plan (NQAP) that reinstituted the QAP at BLN. The QVP is the program that TVA will implement to address the temporary suspension of the QAP and IR activities at the BLN site. This revision to the QVP remains consistent with the approach detailed in TVA's April 2010 key regulatory assumptions letter.

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TVA requests that the NRC review and approve the QVP prior to the reactivation of construction activities at BLN Unit 1. Finalization of the BLN design will follow NRC's approval of the QVP. QVP activities undertaken during construction deferral will be controlled to ensure compliance with the Commission Policy Statement on Deferred Plants (Generic Letter 87-15) and the current NQAP. Successful implementation of the approved QVP will adequately bridge adverse impacts from the temporary suspension of the QAP and IR activities.

Enclosure 1 of this submittal provides the revised QVP, which supersedes in its entirety the QVP provided in Enclosure 1 of TVA's April 1, 2011 submittal. The commitments made in Enclosure 3 of TVA's April 1, 2011 submittal remain valid.

If you have any questions concerning this matter, please call Peter C. Gaillard at (256) 574-8265.

Sincerely,

K. David Stinson, Jr.
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Enclosure(s):

1. Bellefonte Quality Verification Program

cc: See page 3

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Bellefonte

Quality Verification Program

BELLEFONTE QUALITY VERIFICATION PROGRAM
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BELLEFONTE QUALITY VERIFICATION PROGRAM

1.0 Background and QVP Overview

As of October 1, 2005, TVA had ceased project completion activities at Bellefonte Nuclear Plant, Units 1 and 2 (BLN). TVA subsequently requested withdrawal of the BLN construction permits (CPs) on April 6, 2006, and the Nuclear Regulatory Commission (NRC) granted withdrawal of the CPs on September 14, 2006. During the period of time that the BLN CPs were withdrawn, the following activities took place:

1. Some plant equipment was removed under TVA's commercially controlled Investment Recovery (IR) program until November 2007, when directions were given to terminate IR activities at the BLN site.

2. The TVA Quality Assurance Program (QAP) was suspended at the BLN site until March 2009, when TVA submitted Revision 20 of the Nuclear Quality Assurance Plan, TVA-NQA-PLN89-A (NQAP), which reinstituted Quality Assurance requirements at the BLN site.

3. Preservation and maintenance activities were not conducted during the period of suspension until April 2009, when a limited preservation and preventive maintenance program was reinstated.

Prior to withdrawal of the CPs, the regulatory history of BLN had been one of exemplary performance. During active construction and through the period of construction deferral, BLN successfully maintained a high rating under the NRC's Systematic Assessment of Licensee Performance (SALP) Program indicating a strong level of confidence in the BLN design control and construction program. Throughout the deferral period, NRC continued to conduct regular reviews and in 15 inspections documented that TVA had adequately maintained BLN's lay-up and preservation.

TVA requested reinstatement of the CPs on August 26, 2008. The NRC granted TVA's request and reinstated the CPs by Order dated March 9, 2009, placing BLN Units 1 and 2 in "terminated plant" status under the Commission's Policy Statement on Deferred Plants, NRC Generic Letter (GL) 87-15. TVA reinstituted the QAP at BLN on March 16, 2009, and began a voluntary, multi-level readiness assessment in preparation for transitioning to deferred status, as defined in GL 87-15. This assessment consisted of several internal and external audits and self-assessments by nuclear QA and licensing experts, including a formal TVA Nuclear QA Audit. The results of those assessments were documented and follow-up actions are being addressed under the BLN Corrective Action Program (CAP).

TVA requested the NRC authorize transition to deferred status by letter dated August 10, 2009. The NRC performed an inspection of TVA's readiness to transition to deferred status as documented in their inspection report dated December 2, 2009. The NRC reviewed TVA's assessments of readiness for transition to deferred status during the inspection and concluded in the inspection report that "the audits and self-assessments conducted to assess readiness to

transition to a deferred plant status were of good quality." NRC subsequently authorized placement of BLN into deferred status by letter dated January 14, 2010.

Because IR activities took place during the period of time that the QAP was suspended and preservation activities ceased, the condition, quality and supporting design documentation of some currently installed and stored plant Structures, Systems and Components (SSCs) was classified as indeterminate, thereby compromising several of the 10 CFR Part 50, Appendix B QA criteria. As a result, one of the corrective actions from TVA's deferred status readiness assessments was the generation of Level B Problem Evaluation Report (PER) 170988. PER 170988 addressed the suspension of the QAP and was evaluated for reportability under the requirements of 10 CFR 50.55(e) and subsequently determined to be reportable. TVA submitted the report to the NRC by letter dated May 14, 2009. The report described that configuration control was not maintained and physical equipment issues were not documented during the period of time the QAP was suspended. The report to the NRC also contained the following two corrective action commitments:

1. "Structures, systems and components (SSCs), as defined by 10 CFR Part 50, Appendix B, that have been subject to long term deferral or affected in the course of resource recovery activities will be entered into the corrective action program and prohibited from being placed into service without evaluation and having been restored or replaced."

2. "Should TVA decide to complete construction of BLN, TVA will perform an evaluation of SSCs, as defined by 10 CFR Part 50, Appendix B, to determine whether to restore or replace such in order to meet full design qualification."

In order to address the potential effects of the temporary suspension of the QAP, the effects of IR related activities and the temporary cessation of preservation activities, TVA is implementing a Quality Verification Program (QVP) at BLN. The BLN QVP applies approaches similar to the Nuclear Performance Plan programs previously implemented during the initial licensing of Watts Bar Unit 1, the recovery and restart of Browns Ferry Unit 1, and the program TVA is currently implementing at the Watts Bar Unit 2 construction completion project. The QVP is being developed and implemented under the current NQAP, and includes the three basic elements previously identified in the second key assumption of TVA's April 9, 2012 letter to the NRC outlining the key assumptions for the possible completion of BLN construction activities. The three basic elements are QA Records Verification, Design Baseline Verification, and Replacement Items Verification. Additionally, the QVP will include a fourth element, which is a Refurbishment Program similar to the program being implemented at Watts Bar Unit 2. The QVP is designed to work in conjunction with other BLN design and construction programs and processes and when complete will:

- establish the current condition of the plant including the effects of IR related activities and pre-service degradation,
- verify consistency between the construction status database and the current as built plant configuration. When accomplished, this will enable restart of plant configuration control under the reinstated QAP and Configuration Management Program,
- confirm that quality records are complete, accurate, stored properly and retrievable,

- provide a methodology, basis and procedures to enable informed engineering decisions to replace or refurbish plant SSCs and warehouse replacement items, and
- identify any required remediation efforts.

The term "design baseline documents" is used throughout the QVP. Within the context of the QVP, design baseline documents include the plant and vendor drawings that define the physical configuration of plant SSCs and the 10 CFR Part 50, Appendix B QA records that are associated with them.

Once BLN plant construction status has been reestablished, the implementation of other BLN programs and processes, such as the engineering design process, CAP, Preservation and Preventive Maintenance Program, Construction Management Process, Configuration Management Program, the NQAP and others will provide controls to ensure that:

- prior to construction and as construction proceeds, plant SSC material condition is preserved via the Preservation and Preventive Maintenance Program pending long term replacement, refurbishment or other disposition,
- as designs are changed, SSCs are replaced and refurbished, and as construction and testing proceed, design configuration control is maintained, and
- the regulatory commitments as articulated in the BLN Regulatory Framework submitted to the NRC on May 5, 2011 are incorporated into the final design.

The QVP will be accomplished by conducting a series of comprehensive plant walkdowns, inspections, tests, document reviews and assessments. Consistent with current program requirements implemented under the QAP, discrepancies identified during QVP activities will be entered in the CAP for any required remediation, and evaluated for reportability in accordance with 10 CFR 50.55(e) and 10 CFR Part 21.

As noted previously, the BLN QVP is similar in nature to the applicable elements of the Nuclear Performance Plan programs previously implemented at Watts Bar Units 1 and 2. Attachment 1 provides a discussion of the Watts Bar applicable recovery programs and highlights where the programs align with the BLN QVP and where they differ. Attachment 1 is included because it is important to explain two key points. The first point is that many of the Watts Bar construction, design, and work control issues are not evident at BLN. The second point is that some of the issues associated with BLN's current condition are similar to some issues addressed in the Nuclear Performance Plans, even though the path to the current BLN conditions followed a different trajectory. TVA believes it useful to adapt these successful regulatory approaches for the BLN QVP. As such, the approach, methodology and program elements that the BLN QVP employ are proven and have, for the most part, been previously reviewed and accepted by the NRC on past TVA projects.

TVA is submitting the QVP for the NRC's review and approval prior to reactivation of construction activities and finalization of the BLN design. Some QVP activities associated with recovery of the design baseline have been initiated and are being controlled to ensure compliance with the Deferred Plant Policy Statement and the current NQAP. Successful implementation of the approved QVP will identify and remediate adverse impacts from the temporary suspension of the QAP at BLN and the impact of any IR related activities.

2.0 OVERALL STRATEGY – RECOVER DESIGN BASELINE, REPLACE/REFURBISH AND DEFENSE IN DEPTH

The overall strategy of the QVP is to develop a comprehensive program that fully addresses the conditions and relevant issues from the suspension of the QAP and potential adverse impacts caused by IR activities. First and foremost, the QVP will reestablish the BLN design baseline:

- The design baseline documentation will align with the current plant construction status, including the impact of IR related activities,
- The Engineering Construction, Monitoring and Documentation (ECM&D) database (which tracks the construction, inspection and test status of plant SSCs until they are turned over to operations) will be made up to date and accurate, and
- The general material condition of plant SSCs will be captured and documented.

Once this is accomplished, a fundamental strategy for reestablishing the quality-related physical condition for plant SSCs involves a broad based replacement and refurbishment program. Plant equipment will either be replaced with new, original equipment manufacturer (OEM) supplied equipment that meets the plant design requirements, or will be refurbished to an "as new" condition, including incorporation of appropriate regulatory and industry operating experience upgrades. Dependent upon inspection and evaluation results, there may also be some SSCs that are determined to be acceptable. In these cases the SSCs will not require replacement or refurbishment.

The QVP was also developed utilizing the principle of "defense in depth." Within the context of the QVP, this means that the conclusions from past assessments that confirmed the adequacy of the BLN QA records will be re-confirmed, and additional records will be audited. It also means that the results and conclusions of past projects, which were conducted under quality assurance programs that meet the requirements of 10 CFR 50, Appendix B, to capture the impact of IR related activities will be re-confirmed, including the conduct of new plant walkdowns and document reviews. Finally, it means that many BLN SSCs will undergo more than one physical walkdown and inspection dependent upon their importance to safety, degree of degradation, and the potential to which they were impacted during any IR related activities.

Also, during the period of time the QAP was suspended, BLN retained technical contract management control and oversight, and BLN remained a TVA-owned and controlled site that was governed by TVA procedures. These procedures produced records including work authorizations, directions, tag out hold orders, and warehouse accounting transactions, among other control records. These records describe the work that was performed during the period of the QAP suspension, and are reasonably reflective of SSC status and configuration. Currently, over 50 percent of the initial General System and Building Walkdowns in support of the design verification and design development process have been completed, and these walkdowns verify that records of the work performed exist and are retrievable. The General System and Building Walkdowns are described in Section 5.2 of this document.

In summary, the QVP's overall strategy includes the following elements, as appropriate:

1. Reestablishment of the BLN design baseline through the reconfirmation of results and conclusions of assessments already completed,
2. Performance of overlapping plant walkdowns, inspections, and tests to fully establish the construction status and material condition of the plant equipment,
3. A broad-based replacement of existing equipment with new equipment which meets the plant design requirements and specified industry standards, and
4. Refurbishment of plant equipment to "as-new" equipment conditions which meets the plant design requirements.

3.0 ELEMENTS OF THE QVP AND SPECIFIC OBJECTIVES

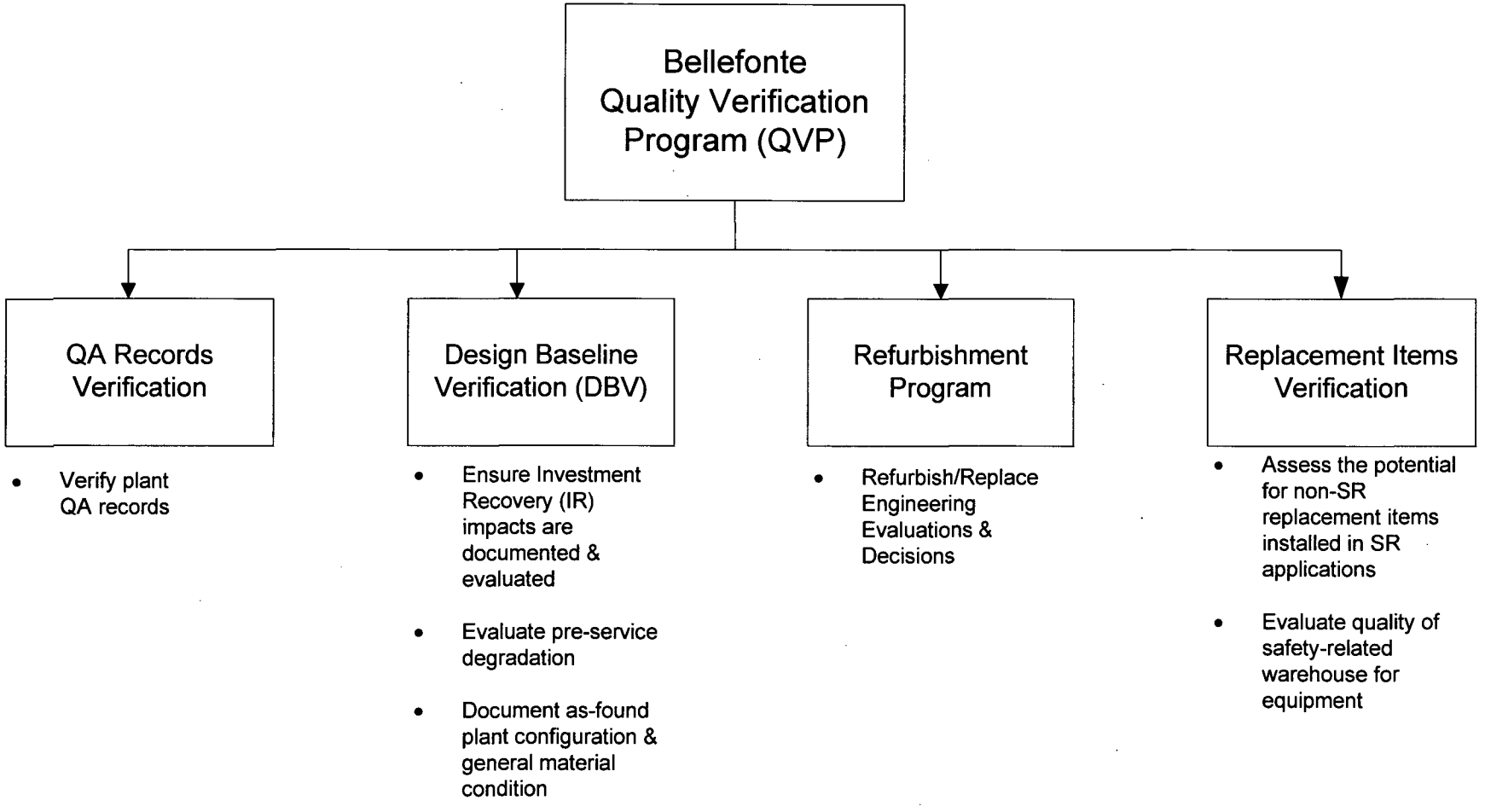
As shown on Figure 1, the QVP consists of four interrelated elements. The four elements and their respective objectives are:

- QA Records Verification, which assesses the potential for missing, damaged, or degraded records as a result of the temporary suspension of the QAP.
- Design Baseline Verification (DBV), which establishes consistency between the current physical plant configuration and the construction status database. The walkdowns associated with DBV are also designed to identify the effects of any direct or indirect IR related activities and pre-service degradation for engineering evaluation.
- Replacement Items Verification, which assesses the potential for nonqualified parts installation in safety-related components during the period of time the QAP was suspended, and evaluates the quality of replacement items for safety-related and quality-related equipment in the current warehouse inventory.
- Refurbishment Program, which assesses the potential for pre-service damage or degradation to installed equipment and provides the methodologies and procedures for engineering decisions to replace or refurbish plant SSCs as necessary.

The QVP will transition to the standard Design Control, Construction Completion, and Configuration Management Programs that will be used for completion of the project.

The following sections provide more detail on each element of the QVP.

Figure 1: Quality Verification Program Elements



4.0 QA RECORDS VERIFICATION

As noted in Section 2.0, assessments by TVA and outside consultants have determined that BLN QA Records are properly stored, maintained, and controlled. In October 2009, the NRC reviewed these assessments, conducted walkdowns of QA record storage facilities and assessed retrieval, access control, quality, storage, and protection of records during an inspection at the BLN site. The results were documented in an inspection report dated December 2, 2009 (NRC Inspection Report No. 05000438/2009601). The NRC concluded in the inspection report that "documents were properly prepared, reviewed, approved, and distributed and that QA records were stored, maintained, and controlled in accordance with the TVA's requirements."

Additionally, a review of ASME records was conducted by Hartford Steam Boiler (HSB) Global Standards, acting as the Authorized Inspection Agency (AIA). HSB concluded in Assessment Report No. 09-01 that there is reasonable assurance that BLN ASME documents and records were properly maintained during the period from March 2005 through October 2009. This assessment bounds the period of time the QAP was suspended.

Notwithstanding the foregoing assessment results, QA Records Verification will be conducted as a part of the QVP to provide additional confirmatory evidence demonstrating that required BLN QA records are complete, in good condition, are retrievable and are maintained in appropriate storage facilities.

QA Records Verification will consist of a systematic records review of BLN records using sampling and statistical analysis techniques to provide a high level of confidence in the adequacy of historical QA Records (i.e., records created prior to reinstatement of the QAP at BLN in March 2009).

4.1 Description of Program Activities

TVA will use a systematic records review process to address any potential problems with QA Records. The scope of the systematic records review is designed to be comprehensive in breadth by evaluating various groups of records currently applicable to BLN for impact of the different storage conditions that existed during the temporary suspension of the QAP. The review is also designed to have depth by reviewing a statistically significant sample of records within each group against record attributes that confirm records quality. Upon completion, the systematic records review will provide a high level of confidence in the adequacy of historical QA Records.

There are three criteria that will be satisfied to ensure the adequacy of records: technical accuracy, quality of documentation (existence, completeness of results and authorization, legibility, accuracy of references, and correctness of changes), and availability (retrievability and storage).

The systematic records review will address the second and third criteria (i.e., quality and retrievability). The DBV addresses the first attribute (i.e., accuracy).

Details of the systematic records review methodology are provided in Attachment 2.

4.2 Reconstruction of Missing Inspection and Non-Inspection QA Records

The BLN project had previously developed a set of controls to address the reconstruction of missing inspection QA records for inspections that were performed prior to construction deferral and not statused as complete in ECM&D (Records Accountability Program module). The reconstruction effort is accomplished by the organization responsible for the inspection QA record by using supporting information of acceptance (e.g., inspector's log books, signed off drawings, or copies of data cards). These controls were not implemented as a result of the QAP suspension; instead, they were developed to address the issues associated with changing resources over the active construction period. Should it be determined that inspection QArecords are missing, these controls will be used to reconstruct the missing records.

For missing non-inspection QA records, the responsible organization ensures reconstruction of the missing records using supporting information such as logbooks or signed-off drawings. The responsible organization manager shall perform an evaluation of missing non-inspection QA records not statused as complete in ECM&D and take appropriate action in accordance with approved administrative procedures.

The controls for the reconstruction of missing QA records are defined in BLN procedure BPP-31.2, "Records Management."

4.3 Resolution of Record Deficiencies

Should it be determined that deficiencies exist due to either missing or degraded records, they will be evaluated and dispositioned in a manner consistent with the purpose and significance of the record. Approaches for disposition may include one or more of the following with the options shown in order of priority:

- Retrieval of information from alternative and/or redundant source documents that attest to or substantiate the quality of the feature.
- Use of information generated by BLN programs (including DBV, Replacement Items Verification, and CAP) that provide new or superseding information.
- Use of testing and other performance data.
- Use of re-inspection, re-testing, re-analysis, re-work, or replacement of the plant feature in accordance with the current QAP. Re-inspections will be performed in accordance with established procedures and acceptance criteria. If there are cases where current inspection requirements and acceptance criteria are less stringent than the original or an inspection attribute is inaccessible, justification will be provided.

The following guidelines govern the approach of applying dispositions for record problems. Dispositions vary based upon the significance of the record(s) consistent with NRC guidance provided for the QA Records Program used at Watts Bar Unit 1.

- Records required by NRC regulations - Implement corrective actions to replace the records, or modify the existing records to bring into conformance, or justify an exemption for NRC approval. In Table 1, TVA has identified the specific set of records in this category for which an exemption request will be submitted to the NRC if the records are

missing and not otherwise recoverable.

- Records required to demonstrate qualification of safety-related features, attributes, and functions of the plant or activities - Implement any of the above corrective actions, or create alternative records, or develop alternative technical bases demonstrating qualification.
- Records required to demonstrate qualification of quality-related items or activities - Implement any of the above corrective actions, or demonstrate (by providing alternative information) that the requirements are met, or justify changing the requirements.
- Records required by TVA procedures (but not falling in any of the above categories) - Implement any of the above corrective actions if the record supports future operational support, or justify its existing condition, or justify elimination or modification of the records requirement. Records may be eliminated from consideration if they represent intermediate documentation that was evolutionary to other final documentation and/or have been superseded.

Table 1: Records Requiring an Exemption Request If Missing

Regulation	Records
10 CFR Part 21	Defects and Noncompliance Reports (Part 21 Evaluations)
10 CFR 50.34	Preliminary and Final Safety Analysis Reports
10 CFR 50.44	Post-Accident Combustible Gas Control System Analysis
10 CFR 50.46	Emergency Core Cooling System Analysis
10 CFR 50.48	Fire Protection Analysis
10 CFR 50.49	Environmental Qualification Program Evaluations
10 CFR 50.54(a)	Quality Assurance Plan
10 CFR 50.54(o)	Primary Reactor Containment Leakage Testing Records
10 CFR 50.55(e)(l)	Deficiency Reports During Construction (50.55e Evaluations)
10 CFR 50.55a	Records Demonstrating Conformance to ASME Boiler and Pressure Vessel Code Sections III And XI - Code Data Reports - Radiographs and Radiographic Test Results - Hydro Test Results Records Demonstrating Conformance to IEEE-279
10 CFR 50.61	Fracture Toughness Technical Analysis
10 CFR 50.62	Anticipated Transients Without Scram Technical Analysis
10 CFR 50.63	Loss of All Alternating Current Power Technical Analysis
10 CFR Part 50, Appendix B	Quality Assurance Plan
10 CFR Part 100, Appendix A	Final Safety Analysis Report

The results of these disposition and corrective action activities will be documented. For those plant features that are confirmed to be adequate as described above, the associated QA records will be superseded or supplemented to reflect the resolution of the issue. A cross reference will be added to the record index to supplement the original record with the appropriate documentation that demonstrates acceptability of the component.

Records issues that cannot be resolved with original or supplemental records will be entered in the CAP for disposition. Issues will be considered design significant if, after an engineering evaluation, they are found to be in nonconformance with appropriate codes, standards, or licensing requirements. Issues determined to be design significant will (1) have a cause analysis performed, (2) have an extent of condition evaluation, (3) have recurrence controls implemented, and (4) be resolved by corrective actions such as rework, repair, or commitment revision if technically justified. Documentation of completed corrective actions will replace or supplement the deficient records.

4.4 Program Implementation

Implementation of QA Records Verification will be carried out by a Record Review Team responsible for performing the record reviews and resolving identified problems. The Record Review Team will include representatives from applicable BLN line organizations. In some cases the Record Review Team may utilize additional expertise from other line organizations or outside of TVA.

The TVA QA organization will ensure that this program is implemented properly and that the records generated meet 10 CFR 50, Appendix B requirements.

4.5 Conclusion

BLN QA Records Verification will address the potential for missing, damaged, or degraded records caused by the temporary suspension of the QAP. It will provide reasonable assurance that the necessary QA Records exist, are retrievable in an acceptable manner, and are of the required quality to support the licensing of BLN.

5.0 DESIGN BASELINE VERIFICATION (DBV)

The purpose of the DBV element of the QVP is to assure that the plant design baseline is fully recovered and documented. It will:

- Confirm consistency between the BLN design baseline documentation and the as-found plant configuration status, including potential impacts resulting from IR related activities and pre-service degradation. Where inconsistencies are determined to exist, corrective action will be taken to understand the nature of the inconsistency and align the design baseline documentation accordingly. The procedures that govern this process are described further herein and in the CAP as discussed in Section 9.0.
- Update the ECM&D database to reflect the current construction status of plant SSCs, including the reclassification of database records for installations, inspections, or tests previously classified as complete that should now be classified as incomplete.

The DBV is necessary to address the following conditions:

- Inconsistencies between the actual plant configuration, the as-constructed drawings, other documentation and the ECM&D database.
- Actual and potential damage to plant SSCs due to IR activities.

These conditions exist as a result of:

- Controlled activities to remove plant components for use as replacement parts for other projects, and
- Physical configuration changes without QA controls and oversight during the period the QAP was suspended.

Many of the equipment deficiencies identified through the DBV will be corrected as a result of the extensive replacement and refurbishment of plant equipment planned for the BLN project.

The DBV element of the QVP consists of a series of walkdowns and inspections. These walkdowns and inspections start with general condition assessment walkdowns, then progress to more detailed walkdowns to assess potential damage from IR activities and support design verification activities, and culminate in detailed inspection activities associated with equipment replacement and refurbishment. Based upon the results of these activities and completion of any remediation indicated, BLN plant documentation, drawings, ECM&D database, and QA records will be updated for use in finalizing the design.

The design control process will be used to develop a new set of Configuration Control Drawings to replace the existing set of as-designed and as-constructed versions of the drawings. These drawings will be produced as part of the design completion work.

Each component of the DBV is discussed below.

5.1 Initial Configuration Recovery Effort

TVA retained Sargent & Lundy (S&L) during the period from September 2008 to December 2009 to implement initial configuration recovery efforts by determining and documenting the impacts of IR activities on BLN plant configuration and drawings. This effort used walkdowns to:

- Identify cut lines and equipment removed from the plant by the IR activities,
- Identify collateral damage resulting from equipment removal in the accessible areas within the Turbine Building, Control Building, Auxiliary Building, Reactor Building, and the Diesel Generator rooms, and
- Identify installed plant equipment that was removed for shipment offsite (unrelated to IR activities).

Plant drawings were marked up documenting the removed equipment and collateral damage from IR activities. The ECM&D database records were updated to reflect the current equipment status. Each Unique Identifier (UNID) within ECM&D contains a list of the items that are required for the particular component.

The NRC reviewed the results of the S&L Configuration Recovery Project as documented and referenced in a BLN inspection report dated December 2, 2009 (NRC Inspection Report 05000438/2009601). The NRC inspection team noted that programs were established to capture the overall impact of the IR activities and that the documents used by BLN to identify and record items that were damaged and/or removed during the period of time when the QAP was suspended appeared to be detailed and accurate.

The S&L configuration recovery effort also included an assessment of the ECM&D status for randomly selected items that were outside of the IR impacted areas. Two methods were used to assess ECM&D configuration control in accordance with S&L procedure PI-TVAN-07, Bellefonte Nuclear Plant Configuration Control Assessment. Method A selected an assortment of mechanical, electrical and instrumentation devices. The ECM&D records were compared to actual plant configuration. Method B used walkdowns in the plant to select a sample of altered or removed equipment. The ECM&D database was then checked to assess whether it accurately reflected the existing configuration. Both Method A and Method B selected specific components/devices from various systems and included items from the Turbine Building, Auxiliary Building, Diesel Building, Control Building and Reactor Building. Additional work was commissioned with S&L to address lessons learned from this assessment.

The results of the S&L Configuration Recovery Project were used by TVA management to plan and structure the General System and Building Walkdowns described below.

5.2 General System and Building Walkdowns

The initial set of walkdowns (i.e., the General System and Building Walkdowns) performed at BLN are an integral part of the QVP and specifically support the DBV. These walkdowns are structured to collect field data to support the following objectives:

1. Verify and document consistency between the engineering documentation and the field installation.
2. Validate the construction status of the plant with respect to existing construction records.
3. Identify and document the general material condition of plant SSCs to establish the effects of the loss of environmental control and age-related degradation as input to the Refurbishment Program for the replacement or refurbishment of plant SSCs.
4. Identify and document the status of missing SSCs with respect to existing documentation of activities performed during the IR activities.
5. Identify and document collateral damage in the form of missing or damaged SSCs or portions of SSCs resulting from activities performed, but not necessarily documented, during the IR Program.

The General System and Building Walkdowns are performed in accordance with BLN-EDP-11, "Walkdown Procedure for General Walkdown Requirements." Specific Walkdown Checklists are provided in BLN-EDP-11 for Electrical Attributes, Mechanical Attributes, I&C Attributes, Civil Attributes, B31.1 Non-Seismic Piping and Supports, and Building Attributes.

These checklists are designed to accomplish the following key objectives:

- Verify scheduled cables are present and terminated in all system related equipment including instruments, motor operated valves, pumps, etc. Identify electrical equipment within the subject system scope that is missing, damaged and/or degraded.
- Verify pipe routing is consistent with the geometry shown on applicable drawings, (i.e. relative locations and orientations of branch lines, relative locations of in-line components). Identify any additional missing in-line items (including damaged, corroded, rusted, loose, broken, cut, and/or removed components).
- Verify that the installed support types, direction, location, and building attachment are consistent with the applicable mechanical piping/isometric drawings. Note any installed supports that are not shown on applicable drawings and record support number if obtainable.
- Document the general condition of all instrumentation and mountings (mounting brackets, bolts, or welds). Identify any damaged or degraded mounting hardware (dimensions, locations, and type of damage).
- Identify missing parts, damage, or degradation of equipment anchorages, supports, or foundations for the identified system equipment.
- Identify any signs of deterioration (including water intrusion, rust stains, leaching, etc.), deformations, or intentional alteration/damage/removal of building or structural members.

Consistent implementation of key aspects of BLN-EDP-11 is reinforced with the walkdown teams through specific training on the procedure requirements and the use of the discipline-specific checklists.

These walkdowns allow for the production of marked up BLN plant drawings. Clouds with cross-hatching are utilized to delete information or configurations, other than dimensions, that may be different from the design drawings, vendor drawings, or sketches that are being verified. Collateral damage identified from IR activities will be documented in the Walkdown Package on data collection forms. Equipment that exhibits a degraded condition will be noted on a Degraded Condition Form. The types of problems recorded on the Degraded Condition Form include missing, damaged, or degraded equipment. Observed corrosion is also recorded on the form and is characterized as light (i.e., minor surface rust/oxidation with no visible pitting), moderate (i.e., rust with minor pitting visible to the unaided eye), or severe (i.e., significant rust with flaking and/or serious pitting and/or loss of material). Discrepancies identified during the walkdowns are entered into the CAP in accordance with BLN procedure BPP-03.1, "Corrective Action Program." A discrepancy is defined in BLN-EDP-11 as an identified difference between data values or characteristics recorded in an approved completed walkdown package and the actual values or characteristics in the design drawings or as identified by subsequent walkdowns.

During the various reviews of a Walkdown Package, abnormal conditions or equipment deficiencies determined by the reviewers to potentially adversely impact safety, regulatory compliance, or reliability will be entered into the CAP.

The results of the General System and Building Walkdowns are used as input to the engineering evaluations performed in accordance with BLN-EDP-13, "Engineering System Design Package." The Engineering System Design Package (ESDP) lists engineering (new and existing) documents, data, and references that provide the necessary design, procurement, and

construction-related information for a particular scope of work relating to a system, structure or engineering program in order to allow field work to proceed. The ESDP provides a resolution for the degraded conditions identified for a system through repair, refurbishment or replacement. At the 10% completion stage, ESDPs compile design information that provide identification of the engineering scope of work to be performed to reconstitute the design for a given system, structure or engineering program, and are based on data from these walkdowns. Section 8.0 describes how the General System and Building Walkdowns interact with other walkdowns as well as with other BLN programs and processes.

During the 10% completion ESDP Design Review meeting (conducted by a multiple discipline review board), abnormal conditions or equipment deficiencies determined by the review board to potentially adversely impact safety, regulatory compliance or reliability that have not been previously identified will be entered into the CAP. ESDP Design Reviews are conducted at the 10%, 50% and 100% stage of completion.

The NRC completed an inspection at BLN on December 1, 2011 that included observing portions of the Component Cooling Water system walkdowns completed in accordance with BLN-EDP-11. The inspectors observed that the walkdowns were conducted in accordance with approved procedures and the results were accurately documented.

5.3 Detailed Walkdowns for Investment Recovery Zones

In addition to the General System and Building Walkdowns, detailed walkdowns for IR zones will be conducted for portions of systems and other SSCs that are located within IR affected areas of the plant. This will fully satisfy objectives 4 and 5 listed in Section 5.2 for the General System and Building Walkdowns. These detailed walkdowns are mandatory for safety-related and quality-related SSCs and may be used for non-quality related SSCs at TVA's discretion.

TVA assessed areas of the plant to identify areas affected by IR activities. Three levels have been identified to structure the detailed walkdowns:

- Level I - Primary Zone of Influence (PZOI): A PZOI is the area in the immediate vicinity of SSCs where historical documentation or physical evidence indicates that IR activities involving the removal of SSCs have occurred. IR areas are shown on the IR Walkdown Drawings. The PZOI boundaries are defined by a reasonable radius of work and/or the existence of physical barriers that would prevent the IR activities from influencing the SSCs located beyond the barrier. PZOIs include the areas above and below the location of the IR removal activity where the physical configuration indicates that SSCs could have been used for rigging or could represent targets for falling objects. The boundaries of the PZOIs are clearly defined in the walkdowns for Level I areas.

- Level II - Secondary Zone of Influence (SZOI): A SZOI is the area associated with the egress path for the IR removal of SSCs. SZOIs include those areas of the plant that represent the probable paths used for the IR removal of SSCs. The extent of the SZOIs is determined from historical documentation, physical evidence, and /or reasonable assessment of the means used for the IR removal. The boundaries of the SZOIs are clearly defined in the walkdowns for Level II areas.

- Level III - No IR Impact: Level III areas are all other areas of the plant not defined as Level I or Level II. These areas are excluded from the Detailed Walkdowns for IR Zones unless the results from other walkdowns or inspections indicate that specific Level III areas should be included.

The PZOI and SZOI boundaries will be identified by reviewing the IR information related to the PZOIs, interviewing plant personnel that were present during the IR equipment removal activities from the specific PZOIs, and by looking at the physical layout of the plant and equipment.

TVA Procedure BLN-EDP-35, "Walkdown Procedure for Investment Recovery (IR) Zones," specifies the walkdown requirements for PZOI (Level I) and SZOI (Level II) areas of the plant. BLN-EDP-35 Appendix A includes lists of discipline specific attributes to be assessed during the Level I and Level II walkdowns. These lists of attributes, in conjunction with the skills and knowledge base of the people performing the walkdowns, ensure consistency between walkdowns. Additional attributes and types of damage to look for during the Level I and Level II walkdowns will be addressed in the training that the specialized walkdown personnel will receive.

All safety-related and quality-related active and passive SSCs located within a Level I area require a Level I walkdown. All safety-related and quality-related active and passive SSCs located within a Level II area require a Level II walkdown. All of the safety-related and quality-related systems that are within or that pass through the PZOI or SZOI are marked on the appropriate plant drawing. Safety-related and quality-related active SSCs may be excluded from the additional Level I or Level II walkdown scope if they have been predetermined for replacement. SSCs excluded from the Level I or Level II walkdown scope will be specifically documented in the walkdown request.

A Level I walkdown consists of a close external visual inspection of all accessible surfaces of the SSCs to identify and document any direct and collateral effects of IR work. A Level II walkdown consists of an external visual inspection of the surfaces of the SSCs that are visible by normal and assisted means (i.e., ladders, mirrors, binoculars, camera zoom lenses, etc.) to identify and document any direct and collateral effects of IR work.

If during the performance of the Level I or Level II walkdowns a need to establish additional PZOIs or SZOIs is identified, the new PZOIs and SZOIs will be marked on drawings and a new walkdown request will be initiated. Methods of equipment removal (e.g., forklift rigging, skidpan, etc.) will be considered in the determination of the PZOI and SZOI boundaries. These considerations will be addressed in the training of the specialized walkdown personnel.

The results of the Detailed Walkdowns for Investment Recovery Zones are used as input to the engineering evaluations performed in accordance with BLN-EDP-13. The engineering work to support the 50% Design Review for the ESDPs is based on data from these detailed walkdowns. The ESDP resolves the damage identified for plant SSCs through evaluation, repair, refurbishment, or replacement. Section 8.0 describes how the Detailed Walkdowns For

Investment Recovery Zones interact with other walkdowns as well as other BLN programs and processes.

5.4 Detailed Walkdowns for Verification of As-Built Attributes

Five procedures are used for walkdowns that are performed to verify as-built engineering attributes. These walkdowns are also another opportunity to identify missing components, degradation, or plant damage from IR activities that may have been missed by the General System and Building Walkdowns or Detailed Walkdowns for Investment Recovery Zones.

BLN-EDP-30, "Walkdown Procedure for Civil Features," provides instructions for the collection of as-built walkdown data of civil features. The scope of this procedure applies to conduit and conduit supports, cable tray supports, HVAC duct, HVAC supports, miscellaneous structural steel, protection devices, and the Equipment Seismic Qualification Program. The procedure contains a set of checklists that define specific attributes to be verified for each category of civil features.

BLN-EDP-31, "Walkdown Procedure – Electrical," provides instructions for the collection of as-built walkdown data of electrical features. The scope of this procedure applies to electrical equipment, cables (including bend radius and ampacity), cable support in vertical trays and conduits, and electrical penetrations (including those containing Kapton insulation). The procedure contains a set of checklists that define specific attributes to be verified for each category of electrical features.

BLN-EDP-32, "Instrumentation and Control Walkdown Procedure," provides instructions for the collection of as-built walkdown data for instrumentation and controls. The scope of this procedure applies to safety-related, quality-related and non-safety-related (as requested by Site Engineering) instrument lines, instrumentation and instrument panels. Instrument lines, instrumentation, and instrument panels for non-safety-related systems will be inspected for construction completeness and material status only. The procedure contains a set of checklists that define specific attributes to be verified for each category of instrumentation and control features.

BLN-EDP-33, "Mechanical Walkdown Procedure for HELB, MELB, and Mechanical Penetrations," provides instructions for the collection of as-built walkdown data for mechanical features. The scope of this procedure applies to Mechanical Penetrations and systems with potential for High Energy Line Breaks (HELB) or Moderate Energy Line Breaks (MELB). The procedure contains a set of checklists that define specific attributes to be verified for each category of mechanical features.

BLN-EDP-34, "Walkdown Procedure for Piping and Pipe Supports," provides instructions for the collection of as-built walkdown data for piping and pipe supports. This procedure addresses the Category I piping and pipe support issues identified in NRC IE Bulletin 79-14, "Seismic Analysis for As-Built Safety-Related Piping Systems." This procedure also addresses the pipe support base plate and expansion anchor issues identified in NRC IE Bulletin 79-02, "Pipe Support Base Plate Designs Using Concrete Expansion Anchor Bolts."

The results of the Detailed Walkdowns for Verification of As-Built Attributes are used as input to the engineering evaluations performed in accordance with BLN-EDP-13 and the preparation of engineering calculations in accordance with BLN-EDP-2, "Design Calculations." The engineering work to support the 50% (Midcourse) Design Review for the ESDPs is based on data from these detailed walkdowns. The 50% Design Review focuses on the issued design documents and the identification of constraints to completing the design. Section 8.0 describes how the Detailed Walkdowns for Verification of As-built Attributes interacts with other walkdowns as well as other BLN programs and processes.

5.5 Detailed Refurbishment Inspections

Procedure BLN-EDP-25, "Refurbishment Program," identifies the requirements for evaluation of the pre-service degradation of plant equipment/components. Expected pre-service degradation mechanisms have been developed by the BLN Engineering organization for equipment/components based on material types, equipment/component locations, conditions experienced since original installation (e.g., dry or wetted), and equipment/components functional status (i.e., active or passive). The inspection matrix for safety-related and quality-related equipment/component categories is included as Attachment 3 and contains the inspection/test required for each equipment/component or commodity type based on the applicable pre-service degradation mechanisms for the associated equipment/component or commodity (see further discussion in Section 7.0 on the Refurbishment Program). The refurbishment inspection/test activities will use a combination of actual inspections (e.g., direct visual, boroscope, chemical swipes/analyses, etc.) and component-specific testing (e.g., bridge, megger, hi-pot, etc.). These inspections and tests will be used to establish the refurbishment scope of work. The inspections and tests for passive components will be performed on a sample basis. The examination of the various commodities for piping and ductwork will be based on a select number of sample locations that target the suspected problem areas and a limited number of randomly chosen sample locations such that the sample population for the field examinations is representative of the entire population. For those commodities that will be examined based on a sample of the entire population (e.g., piping systems/ductwork systems), the sample locations, examinations/testing at the sample locations, and the acceptance criteria for the examinations/testing are defined in BLN procedure BLN-EDP-27, "Engineering Evaluation for Passive Commodity Refurbishment."

The results of the inspections and tests will be evaluated to determine if any pre-service degradation has impacted the ability of the associated equipment/component to meet its design requirements. If the equipment is found to be not capable of meeting its design requirements, the issue will be entered into the CAP. If an unexpected degradation mechanism is identified, the issue will be entered into the CAP. The results of the evaluations will be documented in accordance with procedures BLN-EDP-26, "Active Component Refurbishment Evaluation," and BLN-EDP-27. Equipment for which the evaluation determines that it will not be capable of meeting its design requirements will either be replaced or refurbished.

The results of the Detailed Refurbishment Inspections are used as input to the engineering evaluations performed in accordance with BLN-EDP-13. The engineering work to support the 50% Design Review for the ESDPs is based on data from these detailed inspections. Section 8.0

describes how the Detailed Refurbishment Inspections interact with the various plant walkdowns as well as other BLN programs and processes.

5.6 Design Calculations

BLN procedure BLN-EDP-2 provides the design controls for engineering calculations at BLN. As a part of the design development process, legacy design calculations will be revised. While the development of design calculations is not a key component of the QVP, it is a critical design basis and configuration management element that utilizes the data generated by the QVP plant walkdowns as input. Because of this, a discussion on the development and control of design calculations is included in this section.

BLN-EDP-2 defines the requirements for the minimum set of calculations (also known as Essential Calculations) required for the project. Essential Calculations are defined as those calculations that:

- Are required to address plant systems or features:
  - Whose failure could result in:
    - A loss of Reactor Cooling System integrity, or
    - The loss of ability to place the plant in the appropriate shutdown mode, or
    - A release of radioactivity off site in excess of a significant fraction of the 10 CFR Part 100 guidelines.
- Provide the basis for Technical Specifications.
- Provide the basis for safety-related operator action or procedure variance.
- Demonstrate compliance to regulatory requirements for design basis events in documented submittals.
- Provide basis for safety-related systems or features.
- Demonstrate compliance with Regulatory Requirements.

Calculations may be classified as Essential even though they are not classified as safety-related (e.g., 10 CFR Part 50 Appendix R Fire Protection calculations). However, all safety-related calculations are classified as Essential.

BLN-EDP-2 also provides controls for Desirable Calculations, which deal with beyond design basis events. For example, Desirable Calculations consider equipment or component failures which exceed the single failure criteria as defined by 10 CFR Part 50, Appendix A or support operational or design considerations of non-quality-related equipment or structures that are not required to support the plant design basis or Technical Specifications.

BLN-EDP-2 identifies example listings of the typical Essential and Desirable Calculations to be produced for the project.

The existing legacy calculations for BLN will be revised, and new calculations will also be produced. The new and revised calculations will be prepared and issued in accordance with the requirements of BLN-EDP-2. The calculations will be based on the as-built attributes obtained through the detailed walkdowns used for verification of as-built attributes. These calculations will become the calculations of record for the BLN project.

5.7 Configuration Management After Walkdowns

The completed walkdown packages contain the marked up drawings produced by the various walkdown efforts. These documents are QA records and are maintained in accordance with BLN procedure BPP-31.2. These walkdown packages in conjunction with temporary changes documented in accordance with BLN procedure BNP-QCP-10.8, "Control of Temporary Installations or Omissions (TIOs)," and the updated ECM&D database collectively reflect the plant construction status. Temporary changes to the plant configuration after walkdowns have been completed are controlled and documented in accordance with BNP-QCP-10.8.

A new set of as-designed drawings will be issued as part of the 100% (Final) ESDP, replacing the former as-designed drawings. The 100% ESDPs are issued for each system, building and engineering program to support construction activities at BLN. The Construction organization will use the new as-designed drawings to complete construction and provide as-constructed status back to Engineering. These as-designed and as-constructed drawings will be reconciled as part of the system turnover process to produce final Configuration Control Drawings (CCDs). These CCDs become the final drawings of record.

The Calculation Tracking System (CTS) is used to support design configuration management controls. CTS is a computer system with search and update capabilities maintained for the purpose of tracking, indexing, retrieving, and cross referencing predecessor and successor calculations and other documents such as other calculations, drawings, design criteria, and change documentation. The CTS meets the requirements for quality software as defined in TVA procedure NPG-SPP-12.7, "Computer Software Control."

As defined in BLN-EDP-2, a predecessor document is a document which provides direct design input information to the calculation. As a minimum, the required predecessor documents are those that, if revised, may require a revision to the calculation. Some examples of predecessor documents are plant procedures, design standards/guides, design criteria, calculations, standard/typical drawings, and vendor drawings. A successor document is a document that contains design information, supported by the calculation, that may require a revision if the calculation is revised. Successor documents are usually design output documents but may also be plant procedures.

5.8 Licensing Basis

The current Licensing Basis for BLN is defined in FSAR, Amendment 30 (the last Amendment submitted to the NRC on December 20, 1991). TVA will update the Licensing Basis for BLN, as outlined in the Regulatory Framework submitted to NRC on May 5, 2011. The proposed Regulatory Framework contains TVA's approach to ensuring compliance with the latest regulations, regulatory guides and industry codes and standards.

The Regulatory Framework commitments are used as regulatory input to the engineering evaluations performed in accordance with BLN-EDP-13, which guide the development of ESDPs. The ESDP reconciles the existing design basis with the new regulatory commitments in two stages. The initial (conceptual) assessment regarding compliance with the proposed Regulatory Framework is performed as part of the 10% ESDP development process where a compilation of design information defines the engineering scope of work to be performed to

reconstitute the design for a given system, building or engineering program. The second (detailed design) assessment regarding compliance with the proposed Regulatory Framework is performed as part of the 50% Design Review for the ESDPs.

The results of the engineering assessments at the 10% and 50% ESDP stages may lead to adjustments to the Regulatory Framework as design details progress.

5.9 Summary of Approach to Design Baseline Verification

Physical configuration walkdowns will be used to establish and document the current as-built condition of the plant and identify physical configuration changes made during the period the QAP was suspended. Any degradation due to aging, loss of environmental control or damage to plant SSCs resulting from IR activities performed during the temporary suspension of the QAP are being assessed and documented. The ECM&D database will be updated. A final report summarizing the walkdown results will be developed as a part of DBV.

Going forward, the engineering design development process will be used to coordinate DBV activities. As noted previously, the engineering design development process ensures that the plant licensing basis is properly embodied within plant design, that the plant design basis is supported by analysis, and that functional plant configuration is properly supported by the design basis.

6.0 REPLACEMENT ITEMS VERIFICATION

The BLN Replacement Items Verification element was developed to establish the integrity of the warehouse inventory of safety-related and quality-related parts and assess the potential for unqualified parts installation in safety- related or quality-related components during the period of time the QAP was suspended. The objectives of this program are to:

- Identify and resolve any quality and technical problems related to unqualified replacement items installed in safety-related or quality-related equipment, and
- Identify and evaluate the quality of replacement items for safety-related or quality-related equipment in current warehouse inventory that will be retained.

6.1 Evaluation of Nonqualified Spare Parts Installed in Safety-Related Equipment

The BLN Replacement Items Verification activities to identify and resolve any quality and technical problems related to unqualified replacement items installed in safety-related or quality-related equipment are discussed below.

6.1.1 Initial Period When Quality Program Was In Effect

All warehouse replacement parts were controlled under the NQAP during the period the QAP was in effect. Any usage of warehouse replacement parts and equipment was controlled and documented. During this period, unqualified spare parts were installed in some cases in safety-related equipment as temporary alterations in accordance with the controls of procedure BNP-QCP-10.8, "Control of Temporary Installations or Omissions (TIOs)." The TIO process was used to track these issues, and the process controls require that unqualified spare parts be replaced with qualified parts prior to construction completion.

6.1.2 Period When Quality Program Was Suspended

TVA has conducted interviews with the BLN staff on site during the period that the QAP was suspended and reviewed available records to determine what maintenance work was performed that could have installed unqualified spare parts. As a result of these efforts, TVA has determined that no maintenance activities were performed and no spare parts were installed in safety-related or quality-related equipment during the period of time the QAP was suspended.

In addition, all active safety-related and quality-related components will be inspected as a part of the Refurbishment Program. During these inspections, any safety-related and quality-related components that were in service during the period of time the QAP was suspended will be identified, and special emphasis will be given to the identification of unqualified replacement parts installation.

6.1.3 Period After Quality Program Was Restored

BLN procedure BNP-QCP-10.8 has been reinstated, and the TIO process is used to track temporary alterations involving the use of unqualified spare parts. As noted previously, the process requires the replacement of the unqualified part with a qualified part prior to construction completion.

In accordance with PER 168868, the BLN warehouses have been quarantined and are not considered as sources for quality-related or safety-related materials, parts, or components. The primary controls on the storage and handling of materials, parts, or components are described in BLN procedure BPP-04.3, "Material Storage and Handling."

The current policy regarding procurement, receipt, and storage activities is in accordance with the policy that was in place during BLN's previous deferral period. That policy is to purchase materials, parts, and components used for maintenance activities during the deferral period to commercial grade standards and track these items in accordance with BNP-QCP-10.8. Upon upgrade of the CPs from deferred to active status, the commercial grade items will be removed and replaced with items that conform to the applicable design output documents, or the item will be commercially dedicated under a process governed by the procedures. Likewise, those items would be purchased, received, handled, and stored in accordance with all requirements applicable to quality-related or safety-related materials, parts, or components.

TVA may also purchase an item to quality-related or safety-related standards in accordance with the requirements of BLN procedures BPP-04.1, "Procurement of Material, Labor, and Services";

BPP-04.2, "Material Receipt and Inspection"; and BPP-04.3. Examples of such purchases would include large components (e.g., steam generators) with long-lead manufacturing times. When such a purchase is made, BLN will ensure that the properly qualified personnel are utilized for any required Procurement Engineering Group, receipt inspection, or handling activities. Likewise, TVA will provide proper storage on site or make arrangements to store the items at some other TVA storage facility that meets the required storage specifications.

6.2 Evaluation of Warehouse Inventory

A systematic process will be used to evaluate any safety-related or quality-related equipment in the current warehouse inventory that will be retained to ensure that no damage or degradation occurred during the period of time the QAP was suspended and that adequate records are available to support quality requirements.

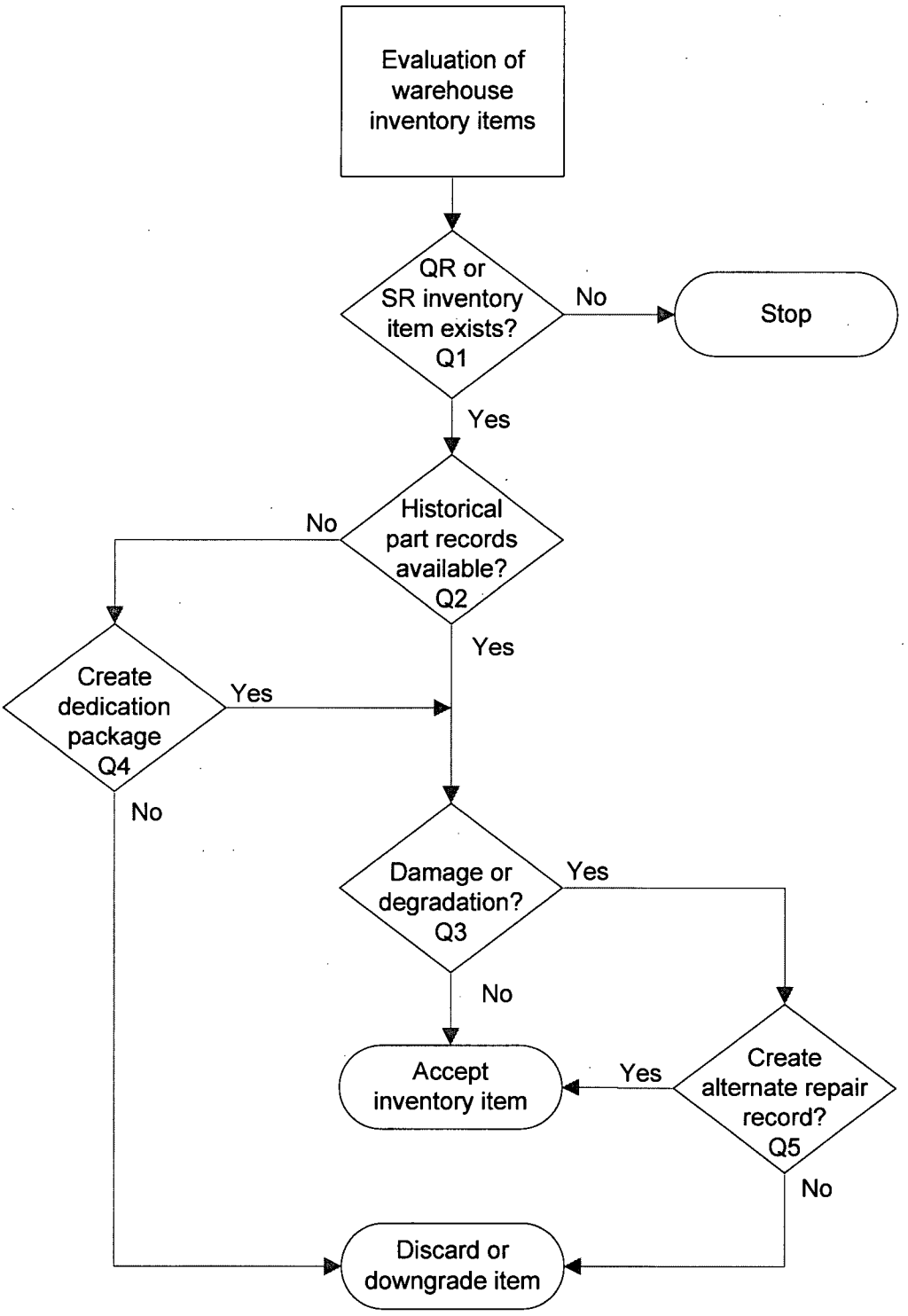
The evaluation process is shown on Figure 2 and begins with answering the following three questions:

1. Do quality-related or safety-related inventory items exist?
2. Are quality records available to establish that the quality-related or safety-related inventory item meets requirements?
3. Is the quality-related or safety-related inventory item free from damage or degradation, using the Refurbishment Program Inspection Matrix contained in BLN-EDP-25 as a guideline for potential damage or degradation mechanisms?

A "yes" answer to these first three questions means that the quality-related or safety-related inventory item is acceptable. A "no" answer to either question 2 or 3 means that additional work must performed to determine the acceptability of the quality-related or safety-related inventory item. These issues will be tracked and controlled by the CAP.

As shown on Figure 2, if historical records are not available, a commercial grade dedication package will be developed to create alternate acceptable records. If this is not possible, the item will be discarded or downgraded to non-safety related status. If the inventory item is damaged or degraded, it will be repaired and documented on alternate quality records. If this is not possible, the item will be discarded or downgraded.

Figure 2: Flowchart of Evaluation Process for Warehouse Inventory Items



The evaluation of safety-related equipment in the current warehouse inventory will be performed in accordance with approved site procedures and maintained as QA records.

7.0 REFURBISHMENT PROGRAM

The BLN Refurbishment Program is the final element of the QVP. The purpose of the BLN Refurbishment Program is to evaluate the potential for actual damage or degradation to SSCs as a result of the cessation of plant lay-up activities and the lack of building environmental controls during the period the QAP was suspended. The BLN Refurbishment Program provides a detailed process to evaluate the condition of SSCs and then make informed, engineering-based decisions to replace or refurbish plant SSCs. In addition, the Refurbishment Program will identify requirements for any SSCs that will not be replaced or refurbished.

7.1 Scope

The Refurbishment Program applies to all active and passive BLN Unit 1 and common (i.e., Unit 2 equipment required for Unit 1 operation) safety-related, quality- related and non-quality related equipment required for Unit 1 operation. SSCs that will be replaced prior to startup will be identified and then excluded from this program since the new equipment will not be subject to pre-service degradation. For the remaining equipment, some items will be refurbished or repaired while others will be inspected and evaluated.

The Refurbishment Program will be conducted in accordance with the following BLN Procedures, which also provide a detailed description of the elements of the Program:

- BLN-EDP-25, "Refurbishment Program"
- BLN-EDP-26, "Active Component Refurbishment Evaluation"
- BLN-EDP-27, "Engineering Evaluation for Commodity Refurbishment"

7.2 Program Implementation

In general, refurbishment will involve inspections, cleaning, flushing, lubrication, replacement of shelf life limited parts (e.g., gaskets, packing, elastomers, etc.), and testing. In many cases, whole components will be replaced rather than refurbished. In other cases (e.g., supports), the equipment will be repaired, as necessary. Consideration shall be given to specific engineering requirements such as environmental qualification when establishing the refurbishment activities required for specific components.

If the equipment is found to not be capable of meeting its design requirements or if an unexpected degradation mechanism is identified, BLN-EDP-25 requires that the problem be entered into the CAP.

7.2.1 Process

The BLN construction refurbishment and evaluation process is shown in Figure 3. The process will identify all equipment required to operate BLN Unit 1, including equipment shared between Unit 1 and Unit 2 (common equipment) required for Unit 1 operation. This equipment is categorized by function in BLN-EDP-25. BLN-EDP-25 provides a required action for each category of equipment. The possible range of required actions include replacement, refurbishment or inspection/evaluation. Attachment 3, "Equipment/Component Categorization and Safety-Related/Quality-Related Inspection Matrix," is excerpted from BLN-EDP-25, and shows the equipment categories and the required action for each category.BLN-EDP-25 also

provides guidance for the inspections to be performed and the expected degradation mechanisms. The details of this process are described in the sections below.

Identification

Identification of all safety-related, quality-related and non-quality related equipment required for Unit 1 operation will be accomplished using the ECM&D database and the BLN Master Equipment List. The identified equipment will be documented by Unique Equipment Identifier (UNID) in the ECM&D database.

Some plant features (e.g., piping/tubing, pipe supports, conduit/conduit supports, concrete, coatings, etc.) do not have UNIDs but will be addressed on a commodity type basis.

Classification

Equipment/components are categorized in BLN-EDP-25 by functions such as structures, pumps, motors, valves, chillers, piping, pipe hangers, transmitters, controllers, etc. The function codes are derived from the ECM&D database and the Master Equipment List and listed in BLN-EDP-4, "Q-List and UNID Control."

Inspection/Evaluation

Refurbishment inspection and evaluation activities are those activities performed to provide assurance that a component functions as designed. Refurbishment activities:

- Are intrusive for active components.
- Do not impact the interfaces with the system within which the components are installed (other than disconnect and reconnect).
- Are aimed at assuring functionality of a device.
- Typically involve replacement of non-metallic parts of active components to assure functionality and system integrity.
- Are performed by personnel trained to perform the work, personnel working at the direction of a subject matter expert, performed by a subject matter expert, or performed by qualified vendor personnel.

With respect to inspection/evaluation, the BLN Refurbishment Program activities are modeled after the Watts Bar Unit 2 Refurbishment Program with additional requirements to address BLN specific issues. For equipment that will be inspected/evaluated, potential pre-service degradation mechanisms have been developed based on material types, equipment/component locations, conditions experienced since original installation (e.g., dry or wetted), and equipment/components functional status (i.e. active or passive). The mechanisms and associated requirements for inspections/evaluations are provided in the governing BLN procedures noted previously. Attachment 3, "Equipment/Component Categorization and Safety-Related/Quality-Related Inspection Matrix," is included to illustrate how these pre-service degradation mechanisms and inspection/evaluation requirements are addressed in BLN-EDP-25.

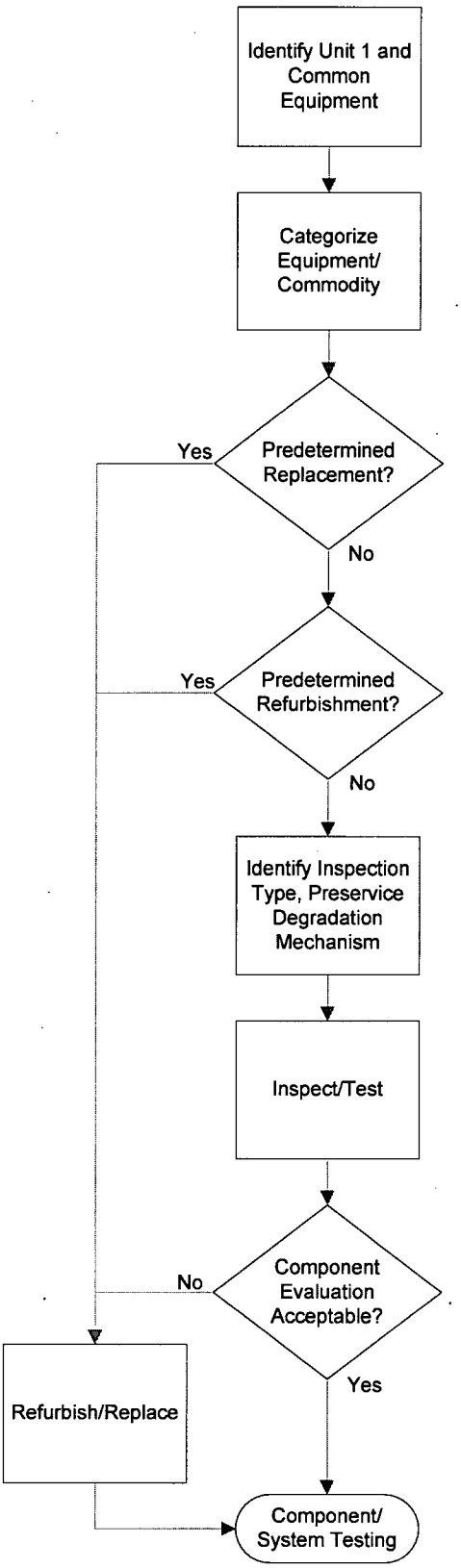
Inspections conducted as part of the Refurbishment Program include both the internal and external attributes of the component. In some cases, disassembly will be required to verify

component integrity which may be affected by time, cleanliness, and conditions of bearing or seating surfaces.

In summary, the progression of the inspection/evaluation task for refurbishment activities is as follows:

- The equipment identified within the Refurbishment Program will be inspected/evaluated for pre-service degradation. In some cases this will require disassembly of the component,
- An inspection matrix will identify specific inspection/test criteria applicable to a given degradation mechanism for an associated equipment, component or commodity type, and
- Evaluations will be performed of active and passive components to determine conditions and document actions to be taken.

Figure 3: Refurbishment Evaluation Process



Refurbishment/Replacement

Acceptance criteria will be developed for equipment categories where the required action is specified in BLN-EDP-25 as "inspect/evaluate." If the equipment meets the acceptance criteria, the equipment will be documented as acceptable and no further action will be required beyond normal equipment lifetime preservation and preventive maintenance. If unacceptable degradation has occurred, the equipment will be refurbished, repaired, or replaced to ensure it will be capable of meeting its design requirements.

For equipment/components which have been predetermined to be refurbished, cleaning, lubrication and replacement of consumable parts such as gaskets or seals will be performed based upon vendor technical requirements, industry operating experience and TVA's expertise to ensure the equipment is capable of meeting its design requirements.

TVA recognizes that ASME Section III refurbishments have special requirements, and these are described in BLN-EDP-25.

Component/System Testing

Prior to Unit 1 operation, industry standard or special component tests will be performed consisting of actions such as motor bumps for rotation, instrument calibrations, flushing, and functional testing of individual components. The tests are intended to demonstrate compliance with component specific specifications and requirements. Portions of the Preoperational Test program, performed in accordance with NRC Regulatory Guide 1.68, further serve as confirmation of a component's capability to meet its design requirements, and will be accomplished under appropriate quality assurance controls. TVA startup manual procedures will be developed later in the project to direct the test program.

System / Component Status Control

As noted previously, any safety-related or quality-related SSCs that have been subjected to long term deferral or affected in the course of IR activities were entered into the CAP and prohibited from being placed into service without evaluation and having been restored or replaced. These SSCs are designated as "deferred equipment" in the ECM&D database. TVA procedure controls prohibit "deferred equipment" from being used in nuclear safety-related applications without further evaluation and having been fully restored or replaced consistent with 10 CFR Part 50 Appendix B.

7.3 Summary of Refurbishment Program Activities

The BLN Refurbishment Program will resolve the potential for pre-service damage or degradation to installed equipment, including collateral damage from IR activities performed at the plant during the period the QAP was suspended.

The program activities will perform the necessary inspections/evaluations, refurbishment/replacements/repairs, and system testing to ensure the plant meets its licensing, design and equipment vendor specifications. In addition, acceptance criteria will be developed for SSCs that will not be replaced, repaired, or refurbished.

Upon completion of the equipment inspections and evaluations and any associated refurbishments, equipment will be maintained in a preservation and preventive maintenance program that is integrated with the overall construction completion activities. Furthermore, controls will be put in place to ensure that restored status is maintained under the BLN preservation and preventive maintenance program, which is discussed further in Section 10.0.

8.0 QVP INTERFACES WITH OTHER BLN PROGRAMS, PROCESSES AND PROCEDURES

As noted in the introduction, the QVP should not be considered a "stand alone" program. Its individual elements interact between themselves as well as with other BLN Programs and processes. As shown on Figure 4, the central integration point is the engineering design process where ESDPs are produced under BLN- EDP-13. The ESDP process develops design output which will ultimately be translated into construction packages.

Examples of inputs to the ESDP include:

- Results from the DBV walkdowns and documentation reviews
- Results from the QVP Refurbishment Program
- Results from the QVP QA Records Verification
- BLN Regulatory Framework requirements including NRC Generic Communications and Unresolved Safety Issues
- Historical BLN Open Items, including Licensing Commitments
- Operating Experience reviews
- Existing drawings, analyses and other design basis information

Examples of outputs from the ESDP process include:

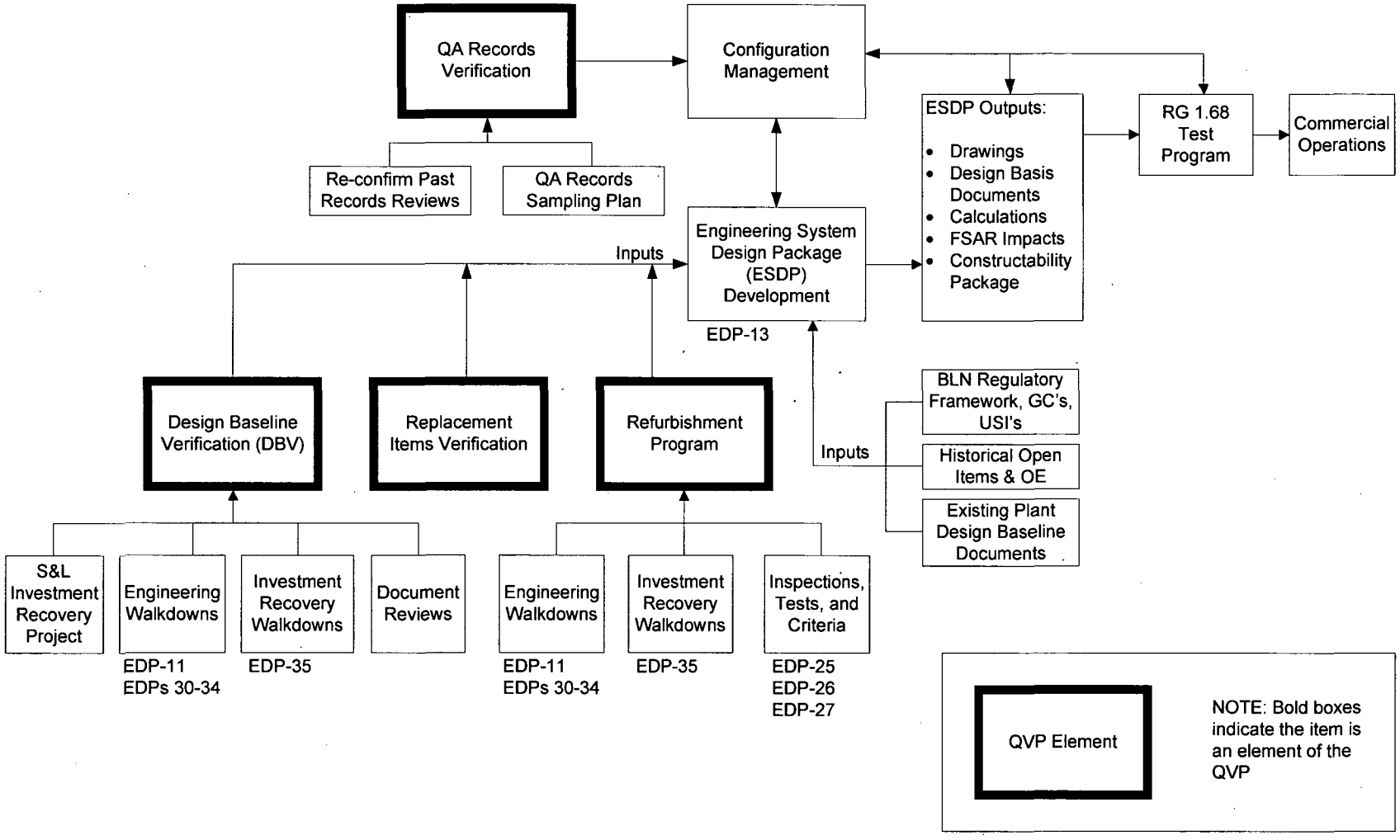
- Design Calculations, analyses and drawings
- Design Basis Documents
- FSAR Impacts
- Input to Construction Packages

As shown on Figure 4, the four elements of the QVP provide critical input at various stages in the development of the system ESDPs. The Quality Records Verification element of QVP interacts primarily with the Configuration Management Program ensuring that records are accurate, stored properly and retrievable. The Configuration Management Program in turn interfaces with the ESDP process to capture changes from the design baseline which will occur throughout the design and construction completion process.

The DBV element of the QVP provides information about the design baseline of the plant and integrates this information into the ESDP process.

The Refurbishment Program and the Replacement Items Verification efforts provide input to the ESDP process on SSCs that will be replaced or refurbished. These decisions are then reflected in the design packages, design analyses, design basis documents, CCDs, the FSAR and other design and configuration control documentation.

Figure 4: Quality Verification Program and Other BLN Programs, Processes, and Procedures



9.0 QVP CLOSURE CRITERIA

The QVP is designed to transition the plant from its current status to a known and controlled status in order to support design and construction completion activities. These design and construction completion activities are controlled through the normal project completion processes and are governed by the NQAP. As such, the QVP effort will be considered complete when the following criteria are met:

- TVA completion of the QA Records Verification element of QVP and issuance of a final report on the program results.
- TVA completion of the DBV General System and Building Walkdowns, completion of the Detailed Walkdowns for Investment Recovery Zones, update of the ECM&D database and issuance of a final report on the walkdown results.
- NRC acceptance of the TVA plans for the Detailed Walkdowns for Verification of As-built Attributes that support the detailed design effort.
- NRC acceptance of the Replacement Items Verification element of the QVP including the TVA plans to evaluate and accept safety-related and quality-related equipment in the BLN warehouses.
- NRC acceptance of the TVA plans for the BLN Refurbishment Program.

As noted above, once the plant construction status has been re-established and documented, the BLN design and construction completion activities will be controlled through the normal project completion processes in accordance with site procedures and the NQAP.

10.0 CORRECTIVE ACTION PROGRAM

To meet the requirements of 10 CFR Part 50 Appendix B, and the NQAP, non-conformances requiring engineering evaluation and conditions adverse to quality that are identified during performance of the QVP will be tracked and corrected through the CAP. This process is initiated by entering the issue into the CAP in accordance with BLN procedure BPP-03.1.

CAP issues are evaluated by a screening committee in addition to a management review committee to understand the nature of the potential problem, characterize its potential impact, and, if necessary, develop corrective actions and identify trends. Potentially reportable issues are evaluated by the Licensing organization for reportability under 10 CFR Part 21 and 10 CFR 50.55(e) in accordance with BPP-03.5, "Regulatory Reporting Requirements."

Based upon the results of the QVP, TVA may decide to bin CAP issues to address a class of deviations, non-conformances and conditions adverse to quality rather than creating a single report for each instance. This technique provides for more efficient reporting and tracking, and is commonly used for plant wide programs. For example, a single drawing may create multiple inter-related CAP issues. These CAP issues would be evaluated, tracked, and remediated as a package versus individually.

11.0 PRESERVATION AND PREVENTIVE MAINTENANCE

As noted previously in Section 1.0, preservation and maintenance activities were not conducted at the BLN site from October 2005 to April 2009. TVA's corrective actions to remedy this cessation of preservation and maintenance activity were described previously, including the prohibition from returning plant SSCs to service prior to full examination and refurbishment or replacement, much of which will occur as a result of the QVP.

A limited Preventive Maintenance (PM) program was reinstated in April 2009 to ensure that equipment is maintained in an asset preservation mode and to minimize any further degradation of targeted equipment. This PM program is described in BLN procedure BPP-06.2, "Preventive Maintenance Long Term Lay-up." The program is performed in accordance with the NQAP and is implemented in accordance with procedure BPP-06.2.

NRC conducted inspections of this program at BLN on December 2, 2009 (NRC Inspection Report 05000438/2009601), July 30, 2010 (NRC Inspection Report 50-438/2010-601) and April 21, 2011 (NRC Inspection Report 50-438/2011601), and concluded that the program was in place and being executed in a satisfactory manner. No findings of significance were reported for the three inspections. These findings are consistent with internal TVA audits and surveillances.

BLN intends to reinstitute a full PM Program prior to construction completion on a schedule similar to that implemented for other TVA nuclear plant recovery projects. After installation, equipment that has been refurbished or replaced will be included in the full PM Program to maintain its condition and prevent any degradation prior to RG 1.68 system testing.

12.0 SUMMARY

The QVP addresses the adequacy of BLN quality records and the impact of IR activities during the period of time that the QAP was suspended. It also identifies and documents any pre-service degradation that may have occurred. The QVP entails the review of plant documentation, the examination of plant SSCs via walkdowns, inspections and tests, and a mechanism to address any discrepancies discovered. As the QVP was developed, it became evident that activities being conducted in support of other BLN programs and processes could be integrated into the QVP to help meet its objectives. A key example of this is the walkdowns conducted in support of the engineering design process, which also provide critical QVP information needed to reconstitute BLN design baseline documentation and determine pre-service material condition.

The QVP was developed utilizing the "defense in depth" principle, meaning that there is heavy emphasis on replacing and refurbishing plant equipment to current standards. Therefore, the results and conclusions from past studies, walkdowns and inspections will be re-confirmed, and additional assessments, inspections and walkdowns, many of which are redundant, will be conducted.

The QVP will confirm the adequacy of BLN quality records through the review of projects completed by TVA and outside consultants in addition to the review of a statistically sound sampling of additional quality records. Through the DBV, the QVP will confirm the construction configuration status of plant SSC's as well as establishing their pre-service

condition. This will be accomplished by confirming the results and conclusions of projects completed in the past, by performing an extensive set of new plant walkdowns, inspections and tests, and by aligning plant design baseline documentation with the current as found plant configuration and condition. The Replacement Items Verification element of the QVP will establish the integrity of any warehouse inventory of safety-related parts that will be retained.

The Refurbishment Program will provide a sound engineering basis for the replacement or refurbishment of plant SSCs through specialized plant walkdowns, inspections and tests, coupled with comprehensive engineering procedures to enable informed engineering decisions.

Any discrepancies, non-conformances or conditions adverse to quality and safety identified during the performance of the QVP will be tracked and remediated through the CAP. To preserve the current condition of plant SSCs and to minimize any further degradation, a partial PM Program has been instituted. This partial program will be in place until a full PM Program is developed and operational. This will occur prior to construction completion.

Finally, the results of the QVP are input to the ESDP development process and other BLN processes and programs on a continuous basis until the design is finalized, the required Regulatory Guide 1.68 testing is completed, and the plant is operational.

Attachment 1: Differences from the Watts Bar Programs

1.1 Differences from the Watts Bar Programs

The Bellefonte (BLN) Quality Verification Program (QVP) incorporates the applicable aspects of the Watts Bar (WBN) precedents. Program attributes related uniquely to WBN quality problems are not incorporated into the BLN QVP. The BLN QVP also includes additional attributes unique to the Bellefonte physical condition and configuration to assess age-related degradation, the effects of adverse environmental conditions, and the potential for collateral damage to adjacent SSCs that may have occurred due to investment recovery (IR) activities during the period of time the QAP was suspended.

1.1.1 Design Baseline and Verification Program Differences

The WBN Design Baseline and Verification Program was designed to address the configuration and technical problems that were identified in the final stages of plant design, construction, and licensing. The WBN Design Baseline and Verification Program had three key elements to address these problems: (1) reconciling differences between the licensing basis documented in the FSAR and various amendments to the NRC safety evaluation report, (2) reconciling differences between the as-designed and as-built configurations, and (3) correcting technical inadequacies with calculations supporting the design basis. In addition, the Design Baseline and Verification Program for Unit 2 had to address as-constructed configuration changes resulting from equipment removed for spare part usage on Unit 1 or other plants.

The BLN plant design and construction activities did not exhibit the technical and quality problems identified at WBN. In addition, the BLN licensing was not as advanced as WBN. The BLN Design Basis Verification (DBV) element of the QVP is designed to address differences between the as-designed and as-built configurations resulting from equipment removed for spare part usage on other plants during the period of time that the QAP was in effect and from IR activities during the period of time the QAP was suspended. The system and building walkdowns and as-built configuration assessment will establish the current, as-found configuration of the plant. The DBV walkdowns have a particular focus on the identification collateral damage to adjacent SSCs resulting from IR activities.

1.1.2 Quality Records Program Differences

The WBN Quality Records Program was designed to address the technical and quality problems with required records that were identified in the final stages of plant design, construction, and licensing. The WBN Quality Records Program had three key elements: (1) verification of the existence of required quality records, (2) verification of the technical adequacy of identified records, and (3) correct identified quality and technical problems with required records.

The BLN plant design and construction activities did not exhibit the technical and quality problems with required records that were identified at WBN. The QA Records Verification element of the BLN QVP is designed to verify that the temporary suspension of the QAP did not result in missing, damaged, or degraded required records and correct any identified problems.

1.1.3 Replacement Items Program Differences

The WBN Replacement Items Program was designed to address technical and quality problems with the suitability for use evaluations for spare parts purchased as commercial grade items. The WBN Replacement Items Program had four elements: (1) preparation of commercial grade dedication packages for parts suitable for use, (2) identification and removal of warehouse inventory that was not suitable for use, (3) identification and removal of spare parts that were not suitable for use installed via previous maintenance activities, and (4) identification and removal of spare parts that were not suitable for use installed via previous construction activities.

The BLN project did not exhibit the technical and quality problems with spare parts procurement identified at WBN. The BLN Replacement Items Verification element of the QVP is designed to address potential problems affecting spare parts that might exist because of the temporary suspension of the QAP. It will therefore encompass the third element of the WBN program, with additional attention to the condition of safety-related warehouse equipment to ensure that stored equipment is not damaged or degraded and availability of required procurement records. The BLN Replacement Items Verification will identify and remove spare parts that are not suitable for use that were installed via maintenance activities during the period of time the QAP was suspended. It should be noted that the vast majority of safety-related systems were not in service during the period the construction permits were terminated. As such, little or no maintenance was performed on these systems, minimizing the opportunity for the installation of unqualified parts in an uncontrolled manner.

1.1.4 Construction Refurbishment Program Differences

The WBN Construction Refurbishment Program was designed to address the potential for pre-service degradation of active and passive safety-related, quality-related and non-quality-related equipment that will not be replaced or refurbished prior to Unit 2 operation. The program focused on Unit 2 equipment that was not in service for Unit 1 operation or that were in controlled environments resulting from Unit 1 operation.

The BLN Refurbishment Program is also designed to address the potential for pre-service degradation of all equipment that will not be replaced or refurbished. It focuses on all the equipment required to support Unit 1 operation. The Refurbishment Program is designed to bound the potential for pre-service degradation of active and passive equipment caused by the conditions associated with equipment not in service or exposed to uncontrolled environments for the construction deferral and QAP suspension periods at BLN. The Refurbishment Program inspections/evaluations will have a particular focus on the identification collateral damage to adjacent SSCs resulting from IR activities. TVA will also establish requirements for controlled lay-up and preventive maintenance of SSCs following the assessment.

1.1.5 Recovery Program Precedents

The BLN QVP is based on the following TVA precedents:

- Watts Bar Nuclear Plant Nuclear Performance Plan, Volume 4, Revision 1
- Watts Bar Nuclear Plant Corrective Action Program Plan for Design Baseline and Verification Program, Revision 7
- Watts Bar Nuclear Plant Unit 1 Quality Assurance Records Corrective Action Program Plan, Revision 6
- Watts Bar Nuclear Plant Replacement Items Program Corrective Action Program Plan, Revision 6
- Watts Bar Nuclear Plant Construction Refurbishment Program Procedure 25402-000-GPP-0000- TI216
- NUREG-1232, Volume 4, Safety Evaluation Report on Tennessee Valley Authority: Watts Bar Nuclear Performance Plan
- NUREG-0847, Supplement No. 17, Safety Evaluation Report related to the operation of Watts Bar Nuclear Plant, Units 1 and 2 Docket Nos. 50-390 and 50-391
- Watts Bar Nuclear Plant, Unit 2 -Safety Evaluation Input Regarding Quality Assurance Records Corrective Action Program
- Watts Bar Nuclear Plant, Unit 2 -Safety Evaluation Input Regarding Replacement Items Corrective Action Program
- NRC Staff Evaluation Regarding Watts Bar Nuclear Plant Unit 2 Program for Construction Refurbishment

The BLN QVP incorporates the applicable aspects of the WBN precedents. Program attributes related uniquely to WBN quality problems are not incorporated into the BLN QVP. The BLN QVP also includes additional attributes unique to the BLN physical condition and configuration assessment to assess age-related degradation, the effects of adverse environmental conditions, and the potential for collateral damage to adjacent SSCs that may have occurred during the period of time the QAP was suspended. The BLN QVP also establishes requirements for controlled lay-up and preventive maintenance of SSCs following the assessment.

Attachment 2: Systematic Records Review Methodology

1 RECORDS REVIEW

The Systematic Records Review is focused on an evaluation of records quality and availability. Record quality will be determined by evaluation of records against record keeping requirements contained in TVA standards and procedures. The completeness of the QA records will be considered within this evaluation.

Record availability is a combination of storage and retrieval. Record storage adequacy will be determined by review of the storage facility and the extent to which required records are stored therein.

1.1 Considerations in Record Selection

1.1.1 Records Reviewed

The QA Records Verification element of the QVP evaluates records that represent the current configuration/status. It does not evaluate historical records that have been superseded or retired.

1.1.2 Significance of Storage Conditions

It is desirable to direct the sample selection process using the significance of the storage conditions for different groups of records during the period that storage controls were not in effect. The objective is to group the records according to different storage media (e.g., microfilm, paper, and radiograph) and storage conditions (e.g., storage locations and known problems affecting an area (such as roof leaks)

1.3 Review Process for Evaluation of Records Quality

The sample review process contains the following steps:

(1) Once the samples are selected, the records supporting the current configurations are retrieved.

(2) A checklist is developed which considers the site activity procedures which require the production of QA records and which is sensitive to the following review attributes:

Review Attributes	Examples
Existence	Record missing
Legibility	Results, authorization, or references illegible due to damage or degradation

(3) The records are reviewed and any discrepancies are documented.

(4) Discrepancies are classified by deficiency type (i.e., either primary or secondary; see Section 2), compared to acceptance criteria, and subjected to further evaluations as described in Sections 3, 4, and 5 of this attachment.

2 CLASSIFICATION OF DISCREPANCIES AND ACCEPTANCE CRITERIA

Discrepancies will be classified by deficiency type (i.e., primary and secondary) to assist in the determination of the need and scope for corrective actions, to identify adverse trends, and to evaluate extent of condition (generic implications).

A primary record deficiency is one in which the acceptability of the recorded activity is not documented (i.e. missing records). These are considered primary because their existence results in little or no documentation of the work.

Secondary record deficiencies encompass the remaining types of deficiencies. They include illegibility, damage, or degradation. These are considered to be of secondary importance because the deficient record still provides a reasonable measure of confidence in the adequacy of the recorded activity.

There can be extreme cases of secondary deficiencies that have the same adverse effects as primary deficiencies. Because of this, secondary deficiencies that adversely affect important data or information on the record necessary to substantiate the quality of work or material will be evaluated to determine if they should be categorized as primary deficiencies.

Sampling of the records and hardware will assure there is at least a 95 percent confidence level for each group as follows:

Acceptance Criteria

Deficiency Type	Maximum Deficiency Fraction (%)
Primary	5
Secondary	10

The distinction between the acceptance criteria for primary and secondary deficiencies is based upon the degree to which each type of deficiency reduces confidence in activities affecting quality. Since primary deficiencies result in a greater reduction in confidence, there will be more stringent acceptance criteria for this type of deficiency.

Record deficiencies are individually and collectively evaluated as described in Sections 3, 4, and 5 of this attachment.

3 SAMPLING AND STATISTICAL ANALYSIS

3.1 Objectives and General Principles

The objective of the Systematic Records Review sampling and statistical analysis is to determine whether or not the acceptance criteria specified in Section 2 of this attachment are met. These criteria specify that TVA can accept a given group of records if the fraction of "defects" or deficiencies is less than 5% or 10% for primary and secondary deficiencies, respectively. Conversely, TVA must reject these populations if the fraction of defects or deficiencies is equal to or greater than these values. The sampling is performed in such a

manner that the probability of rejecting the populations at the acceptance limits is at least 95% (thus, the "95/5 or 95/10 tests" for primary and secondary deficiencies, respectively). The 95/5 or 95/10 tests are based on classical statistics. The statistical processes applied are the same as those applied in the recovery program at Watts Bar.

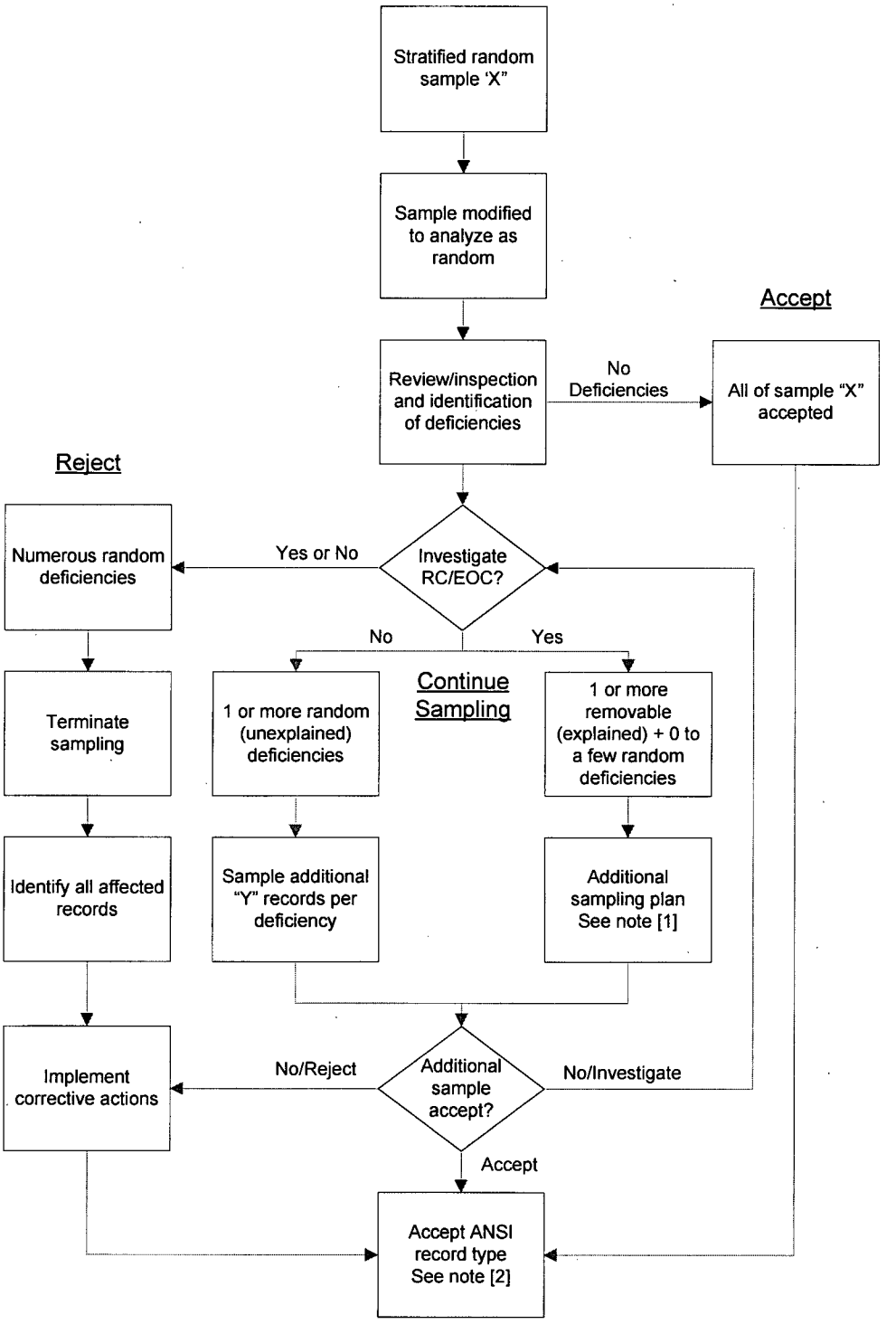
Sampling is sequential (multi-stage), permitting a decision (see Figure A2-1) at the end of each stage to either:

- terminate sampling and accept the population,
- terminate sampling and reject the population, or
- continue with another stage of sampling.

This records review process will likely find a small percentage of deficiencies not related to the temporary suspension of the QAP. Root cause evaluations will be performed if the cause is other than the temporary suspension of the QAP. If the root cause is other than the temporary suspension in the QAP, an extent of condition analysis will follow to identify any subpopulations that share similar causal characteristics. If either the root cause (different from the temporary suspension of the QAP) or extent of condition is indeterminate, the deficiency is considered to be "random" and is left unexplained in the population. If both the root cause and extent of condition are determined, the identified subpopulation is removed from the initial population. The process is repeated for the subpopulation(s) and the remainder of the initial population until each population (or subpopulation) passes the acceptance criteria or is rejected. Excessively deficient populations may be subjected to 100% review/inspection and are corrected in a manner consistent with the nature and significance of the deficiencies (see Sections 4 and 5 of this attachment).

The repeated sampling and investigative root cause/extent of condition processes lead to the subdivision of the initial populations, creating subpopulations that have not been specified prior to the start of sampling. To guarantee the 95/5 or 95/10 acceptance criteria are met, the statistical analyses must recognize the impact of splitting populations and implementing in-process corrective actions because the defect/deficiency fraction changes during the process of sequential sampling. Accordingly, statistical tests on the expected deficiency fraction at the end of each stage of sampling depend on the whole history of found deficiencies up to and including that stage and on the results of the root cause/extent of condition analyses performed for these deficiencies. The sampling plans and population acceptance depend on whether or not deficiencies are investigated and corrected and other factors.

Figure A2-1: Sequential Sampling and Testing Strategy



Note [1] – Sequential sampling plan is dependant upon the size of the subpopulation(s) and the number of random (unexplained) and explained deficiencies.
Note [2] – Prior to acceptance, any deficiency encountered will be corrected.

The following discussions summarize several relevant cases. Details addressing these and other situations are documented in a report entitled, "Sequential Tests for the Hypothesis That the Fraction Defective of a Population is Less Than 0.05," by Dr. Daniele Veneziano, Massachusetts Institute of Technology, May 15, 1992.

3.1.1 Cases When Deficiencies Are Considered Random

If all the deficiencies are considered to be random and left in the initial population, Wald's sequential probability ratio test (SPRT) applies. This test is based on the likelihood ratio:

$$L_i = \frac{L_i(Po)}{L_i(0.05)}$$

where *Li(P)* is the likelihood of having a deficiency fraction of *P* given the sample up to and including sampling stage *i* and *Po* is a preselected hypothetical deficiency fraction below the limiting value of 5% or 10%. The population is accepted if $Li > A$ and is rejected if $Li < B$ where A and B are constants selected so that the test has the required 95% significance level and a given power. Sampling is continued if $B < Li < A$.

A similar sequential maximum probability ratio (SMPRT) can be formulated, which is based on the maximum likelihood ratio:

$$L\max_i = \frac{\max L_i(P) \quad P < 0.05}{\max L_i(P) \quad P \geq 0.05}$$

As for *Li* the acceptance and rejection limits A and B for *Lmaxi* are set to produce a 95/5 or 95/10 test for the final deficiency fraction *P* and to have adequate power.

Many pre-specified sampling plans can be derived using these tests. A specific sampling plan for the Systematic Records Review will be established by specifying the fraction *Po* for the test. In any case, the minimum initial sample sizes will be 60. Subsequent stages of sampling are determined by the associated sampling rules and the number and nature of deficiencies encountered. The following cases demonstrate use of this methodology, each incorporating the 95/5 test.

Case 1: Start with an initial sample size of 72 and accept the population if no deficiencies are found. Otherwise, reject the population or take an additional sample of 40 for each found deficiency. If no deficiencies are found in the additional sample, the population is accepted. Otherwise, the population is rejected or sampling continues using the 40 samples per deficiency rule.

Case 2: Same procedure as for case 1, except that the initial sample size is 60 and the additional sample size per deficiency is 65.

Case 3: Start with an initial sample of 67 and vary the size of the additional sample (or number of acceptable samples needed) as a function of the number of deficiencies encountered.

The acceptance rules for these cases compare as follows:

	Sample Size		
	Equal to or Greater Than		
No. Deficiencies	Case 1	Case 2	Case 3
0	72	60	67
1	112	125	122
2	152	189	162
3	192	254	197
4	232	318	230
5	272	382	262

(Note that the associated rejection rules are not indicated for simplicity.)
Comparing cases 1 and 2, a tradeoff exists between the initial sample size and the size of the additional samples needed to accept the population when deficiencies are encountered. Cases 1 and 2 are based upon SPRTs with $Po = 0.01$ and 0.00222, respectively. Case 3 is based upon the SMPRT.

3.1.2 Cases When Deficiencies are Investigated and Corrected

The methodology must be modified when the sampling strategy includes root cause/extent of condition investigation and corrective action for found deficiencies. The same statistics, L*i* and Lmax*i*, and the same acceptance/rejection levels A and B will be used after replacing L*i*(P) in the previous expressions with likelihoods appropriate to the sampling and population-splitting process.

The analysis depends on whether or not at the time of analysis (typically at the end of a stage of sampling):

a. The size and number of deficiencies included in the subpopulations are known (case X), and

b. If the size and number of deficiencies are unknown, whether the removal of subpopulations decreases the deficiency fraction of the remaining population (Case Y) or may actually increase such fraction (Case Z).

What differs in each case is the way in which the likelihood L*i*(P) is calculated. After this value has been obtained, the analysis procedure is the same as described above for the cases when the deficiencies are not investigated.

For example, assume an initial sample of 72 where the first 71 records are found acceptable and the last record is deficient. The deficient record is investigated and the root cause and extent of condition determined so that the size of the subpopulation and number of deficiencies is known (case X). Upon analysis it is determined that the population cannot be accepted and that an additional sample of 27 items without deficiencies is required before the population can be accepted. This compares to an additional sample size of 40 if the deficiency is not investigated and corrected. This reduction in additional sample size depends on the pattern of random (unexplained) and explained deficiencies and on which of the three cases X, Y, and Z applies. It is important to note that the process of investigation and corrective action reduces the additional sampling required when compared to situations where deficiencies are not investigated and corrected and left unexplained in the population.

3.1.3 Random and Stratified Random Sampling

The above procedures apply to random sampling and can be applied with good approximation to proportional stratified sampling. In an effort to promote the distribution of record samples across Bellefonte hardware elements, some samples will be stratified such that the allocations are not proportional to the strata sizes. If the deficiency fractions are the same in each stratum, then the sampling procedure can be analyzed to be random for the purpose of estimating the deficiency fraction of the full population. Additionally, the analysis for random samples can be used when the strata samples *mi* can be regarded as a random realization from the multinomial distribution with probability parameters $_{Ni/Nj}$ and total sample size $m = mi$, testing using the well-known Chi-square test at a significance level of 5%. If the hypothesis is rejected, then the sample size is augmented and/or depleted until it becomes proportional or can be regarded as random.

3.1.4 Special Cases

The above cases cover a broad set of situations. If cases are identified that do not fit into these particular categories, then procedures will be incorporated that follow the above stated general principles.

In general, TVA will utilize initial sample sizes of at least 60 to review or inspect ANSI record types. This sample will be augmented as required to adhere to the principles described above.

4 DISPOSITION OF RECORD DEFICIENCIES

Individual primary record and hardware deficiencies are identified and corrected, including extent of condition reviews. Extent of condition reviews will also be implemented for secondary deficiencies where acceptance criteria are exceeded. These deficiencies are recorded and dispositioned in accordance with the records resolution process described herein (and in further detail in Section 4.3 of the QVP) and in accordance with the criteria established for Watts Bar in the NRC letter dated October 30, 1990. Associated hardware deficiencies, if any, will be corrected including generic corrections for design significant deficiencies. These records problems will be tracked and controlled by the CAP.

Disposition of record deficiencies will be based upon re-establishing confidence in the quality of the work. The approaches include reconstituting the record or justifying that the record deficiency can be "used-as-is." Alternatively, a direct re-examination of the hardware may be performed. After re-examination, should the quality of the work be indeterminate or unacceptable, the hardware will be corrected including the generation of appropriate records. Should there be a design significant deficiency with the associated hardware, an extent of condition review and appropriate corrective action will be performed.

4.1 Product Records

To ensure consistent disposition results, logic diagrams have been developed to guide the evaluator to disposition two broad record categories, "product records," and "closely associated records." Product records directly relate to the quality of the hardware. The disposition rules for product records are shown in Figure A2-2 and examples of these dispositions are shown in Table A2-1.

4.2 Closely Associated Records

Closely associated records support the product records. They include records such as training, certification, qualification, and calibration records. Because a support type activity may apply to several hardware elements, problems with these kinds of records may also require a hardware extent of condition evaluation. Deficiencies with closely associated records that relate to design significant hardware deficiencies require evaluation of extent of condition in the records as well as in the hardware affected. The disposition rules for closely associated records are shown in Figure A2-3 and examples of these dispositions are shown in Table A2-2.

5 RECORDING RESOLUTION OF RECORD DEFICIENCIES

As a result of the Systematic Records Review for the QA Records Verification element of the QVP, record deficiencies will be resolved by correcting or supplementing the original record. For supplemented records, the records indexing system will identify records used to disposition the record deficiencies to ensure that all qualifying records would be available to a user or inspector of plant records.

The disposition of record deficiencies will be recorded so that the basis is clear and readily retrievable. To accomplish this objective:

- The corrective action document will specify the disposition,
- A supplemental or replacement record will be filed that either provides or references the basis for resolving the deficiency, and
- The record retrieval process will identify both the deficient record and the supplemental or replacement record.

Figure A2-4 illustrates how records will be corrected or supplemented for different types of dispositions. It also shows the requirements for the record's index and the information required to be included in the condition adverse to quality report which records the defects and their disposition.

Figure A2-2: Disposition Rules for Product Record Deficiencies

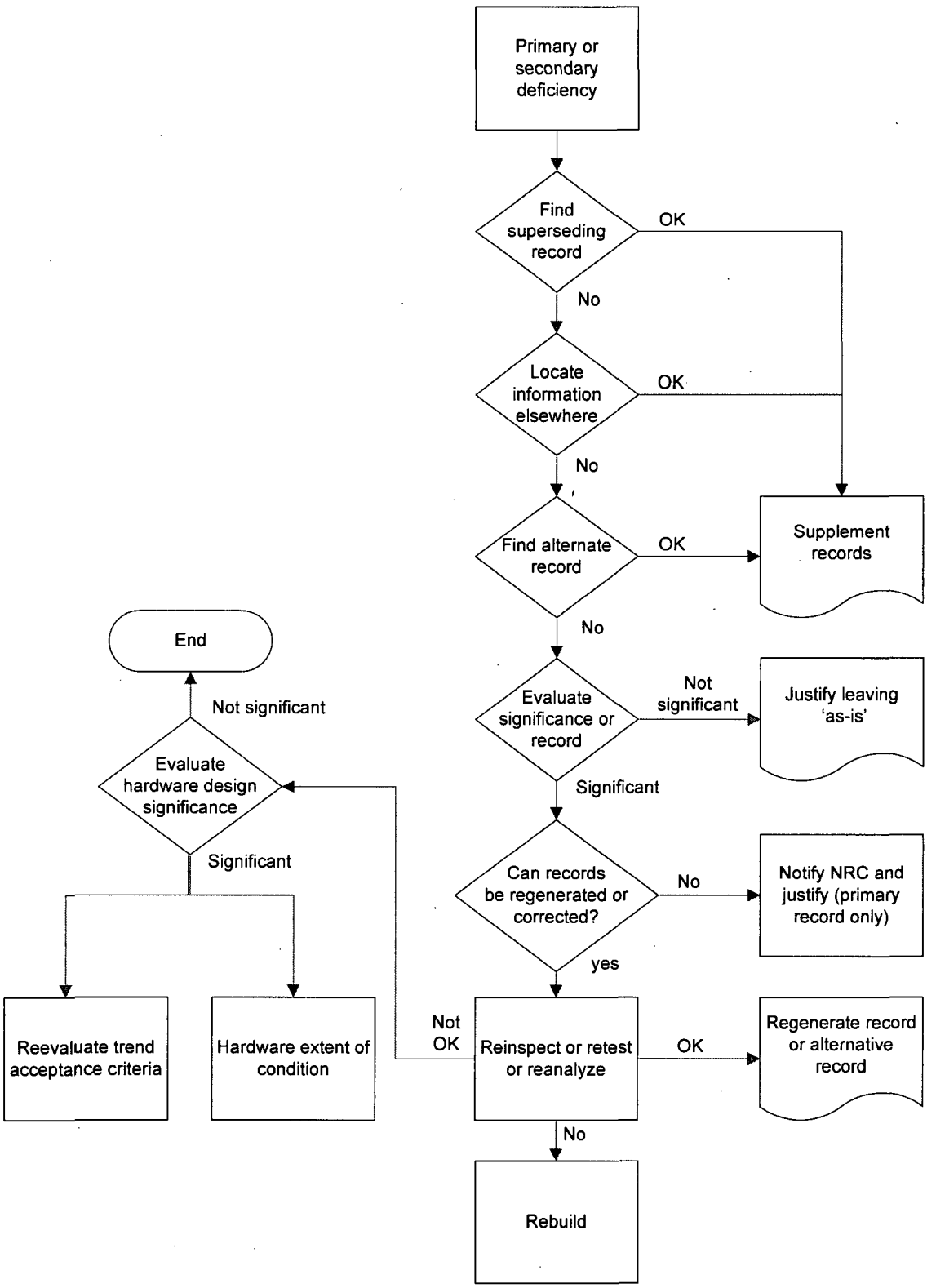


Table A2-1: Example Dispositions for Product Record Deficiencies

Deficiency Category	General Disposition	General Examples
Existence	Re-inspect/test	Re-inspect to current quality control criteria which are demonstrated to be equivalent or better than original inspection requirements
Incomplete	Locate information and add	Locate inspector and inspection logs
Missing record	Superseding record exists	Test 57B is missing but a subsequent re-performance Test 57C is on file
	New alternate record	Evaluation of conduit support critical case attributes to provide confidence in a larger portion
	Old alternate record	Concrete strength record provides confidence in lieu of missing concrete aggregate record

Figure A2-3: Disposition Rules for Closely Associated Record

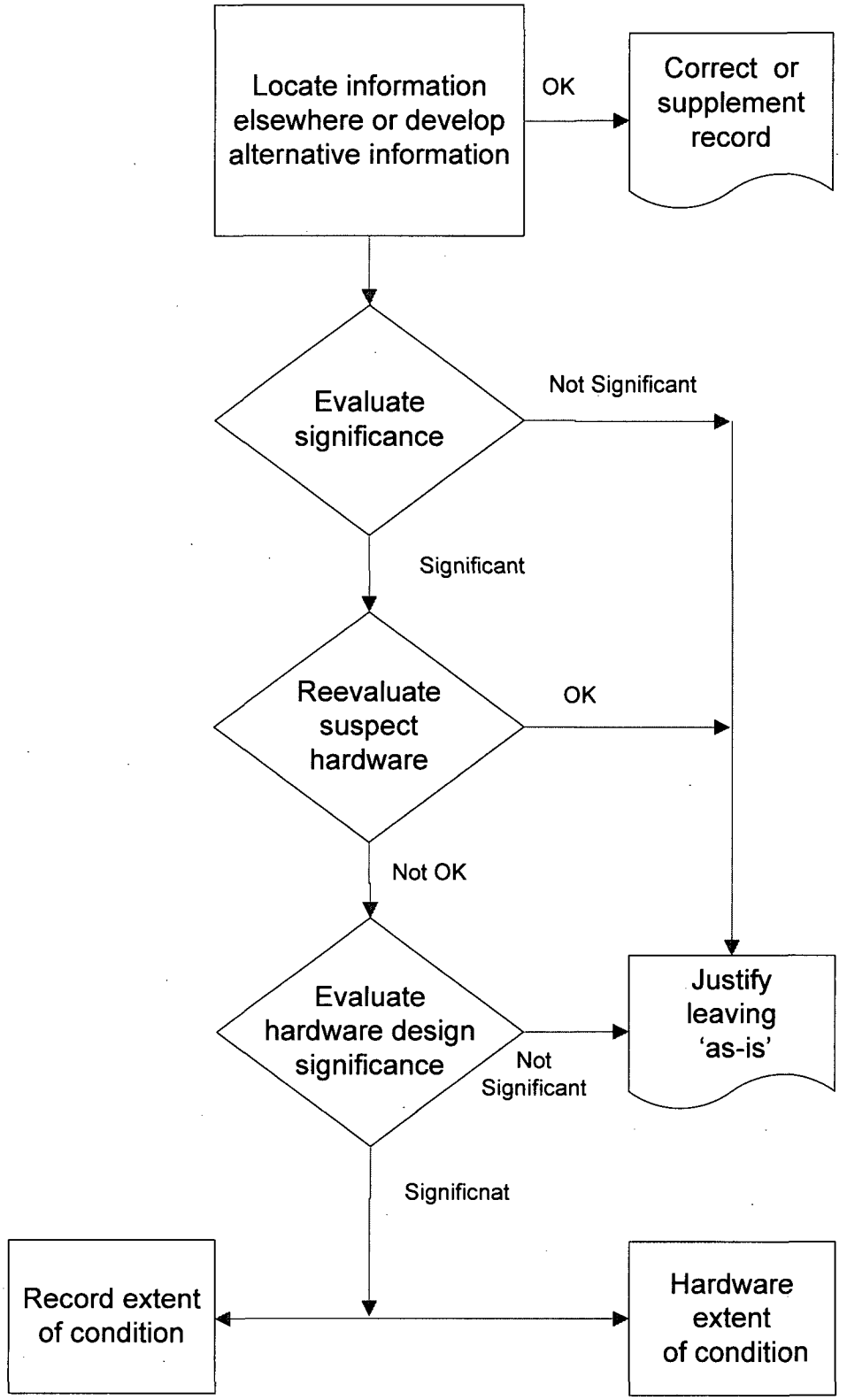


Table A2-2: Example Dispositions for Record Quality Deficiencies

Deficiency Category	General Disposition	General Examples
Existence or Damaged, degraded, or illegible	New alternate record	Statement of those conducting and participating in retraining provide confidence retraining was performed.
	Old alternate record	Class training logs
	Re-inspect/test sample of affected product	Re-inspect cable terminations to current criteria better than or equal to original criteria. Disposition quality problems.
	Regenerate record	Tube bender qualification record missing; however, a qualification test was run on tube bender.
Incomplete	Correct or supplement record	Inspector retraining record incomplete; however, the procedure revision level in effect was not significantly different from the retaining level documented.

Figure A2-4: Recording Resolution of Record Defects

	Deficient Record	Supplemental / Replacement Records	Record Index	Condition Adverse to Quality
Regenerate Record	No change	Replacement record provides new baseline information	Identifies both deficient and replacement record	Specifies replacement
Correcting Records	Correct original record	Supplement provides basis for correction	Identifies both deficient and supplement	Specifies record corrected
Supplementing Records	No change	Supplement specifies additional information and related to initial record	Identifies both deficient and supplement	Specifies record supplemented
Engineering Evaluation	No change	Supplement specifies justification and relates to deficient record	Identifies both deficient and supplement	Specifies justification

6 INTEGRATED ASSESSMENT

The Systematic Records Review results and associated corrective actions will be assessed on a collective basis to demonstrate with reasonable assurance the quality and availability of historical QA records. The bases for these conclusions will be documented as discussed in Section 4.3 of the main report.

Attachment 3: Equipment/Component Categories and Safety-Related/Quality-Related Inspection Matrix

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Civil							
Supports	Passive	Structural Steel	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Welds	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Welds Damage, Arc Strikes, Corrosion (pitting, rust)
		Anchor Bolts	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage or corrosion
		Concrete	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage (spalling or cracking)
		Grout	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage (spalling or missing)
		Unistrut	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Base Plate	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Manufactured component (i.e. Springs, pipe clamps, struts, spring cans)	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
Snubbers	Active	N/A		N/A	Refurbish		
Structural Steel	Passive	Platforms	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Building Steel	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Miscellaneous Steel	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Welds	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)
		Bolting	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage or corrosion
Concrete	Passive	Floor Slabs	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
							cycle, spalling
		Walls	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling
		Concrete Structures	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling
		Pads	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling
		Rebar	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling
		Foundations	N/A	N/A	Inspect	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling
Doors & Hatches	Active	Doors (manual opening)	N/A	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
		Doors (Solenoid Operated, Motor Operated)	N/A	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
		Hatches	N/A	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
		Blowout Panels	N/A	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
		RR Bay Hatches	N/A	N/A	In-service		
		Roll-up Doors	N/A	N/A	In-service		
		Gates	N/A	N/A	In-service		
Seals	Passive	Blowout Door Seals	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage
						2) Hardness inspection	2) Organic material aging
		Expansion Joints	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage
						2) Hardness inspection	2) Organic material aging
		Door Seals	N/A	N/A	Inspect	1) Visual Inspection	1) Physical damage
						2) Hardness inspection	2) Organic material aging
Cranes	Active	N/A	N/A	N/A	Refurbish		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Tendons	Passive	Tendons	Dry	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
			Subject to Wetting	N/A	Inspect	1) Visual Inspection	1) Damaged or corroded
						2) UT or MT	2) Stress corrosion cracking
Electrical							
Battery	Active	N/A		N/A	Replace	[redacted]	
Breaker	Active	Molded Case	N/A	N/A	Replace		
		Switch Gear	N/A	N/A	Refurbish ' Replace		
Cable	Passive	Cable (Medium Voltage)	Underground	Replace	Replace		
			Above Ground	Inspect, Evaluate QL	Inspect	1) Adjust qualified life (For EQ)	1) Organic material aging
						2) Inspect for physical damage	2) Physical damage
		Cable (Low Voltage Control and Power)	N/A	Inspect, Evaluate QL	Inspect	1) Adjust qualified life (For EQ)	1) Organic material aging
						2) Inspect for physical damage	2) Physical damage
		Cable (Shielded Instrument)	N/A	Inspect, Evaluate QL	Inspect	1) Adjust qualified life (For EQ)	1) Organic material aging
						2) Inspect for physical damage	2) Physical damage
		Cable (Multi Axial)	N/A	Replace	Inspect	1) Adjust qualified life (For EQ)	1) Organic material aging
						2) Inspect for physical damage	2) Physical damage
Charger, Battery	Active	N/A		N/A	Replace	[redacted]	
Blocking Diode (Relaying)	Active	Diode	N/A	N/A	Replace		
Contactor	Active	MCC Bucket		N/A	Replace		
		Miscellaneous		N/A	Refurbish / Replace		
Disconnect	Passive	N/A		N/A	Inspect / Refurbish / Replace	1) Inspect for physical damage	1) Physical damage
Fuse	Passive	N/A		N/A	Replace	[redacted]	
Fuse Block	Passive	N/A		N/A	Replace		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Hand Switch	Active	N/A		Refurbish / Replace	Refurbish / Replace	[redacted]	
Heater	Active	N/A		N/A	Inspect / Replace	1) Inspect for physical damage broken insulators, element insulation/corrosion	1) Physical damage
Motor	Active	Medium Voltage	N/A	Refurbish / Replace	Refurbish / Replace	[redacted]	
		Low 480V	Other	Refurbish / Replace	Refurbish / Replace		
		Low 120V	N/A	Refurbish/ / Replace	Refurbish / Replace		
Penetration (Electrical)	Passive	N/A		Inspect / Refurbish / Replace		1) Physical damage	1) Physical damage
						2) Inspect for external corrosion	2) Corrosion
						3) Perform internal inspection for corrosion	3) Moisture corrosion.
						4) Evaluate qualified life	4) Organic material aging
						5) Perform dielectric test	5) Physical damage
						6) Perform OEM Recommendations	6) N/A
						7) Leak Test	7) Physical damage. Organic material aging.
Relay	Active	Time Delay	Pneumatic	N/A	Replace	[redacted]	
			Electronic	N/A	Replace		
			Electro Mechanical	N/A	Refurbish / Replace		
		Protective Relays	Electro Mechanical	N/A	Refurbish / Replace		
			Electronic	N/A	Replace		
		Auxiliary	Electro Mechanical	N/A	Replace		
			Electronic	N/A	Replace		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Seal	Passive	N/A		Replace	Inspect	1) Inspect for physical damage	1) Physical damage
Solenoid	Active	N/A		N/A	Refurbish / Replace	[redacted]	
Solenoid Valve	Active	N/A		Replace			
Splice	Passive	Subject To Submergence	N/A	Replace	Replace		
		Not Subject to Submergence	N/A	Replace	Replace		
Switch Gear Primary Bus	Active	N/A		N/A	Inspect / Refurbish	1) Inspect bus connections for physical damage	1) Physical damage.
						2) Perform micro ohm test from bus to stabs	2) Connection creep. Fastener cracking.
						3) Switches, linkages, contacts, etc. are refurbished per manufacturer	3) N/A
Switchgear Distribution (compartment)	Active	N/A		N/A	Inspect / Refurbish	1) Inspect bus for physical damage	1) Physical damage.
						2) Perform micro ohm test from bus to stabs	2) Connection creep. Fastener cracking.
						3) Switches, linkages, contacts, etc. are refurbished per manufacturer	3) N/A
Terminal Block	Passive	N/A		Replace	Inspect / Replace	1) Inspect bus stabs for physical damage	1) Physical damage or corrosion.
Transformer	Active	Dry	MCC Control	N/A	Replace	[redacted]	
			Control (Potential)	Inspect / Replace	Replace		
			Control (Current)	Inspect / Replace	Replace		
			Large Power	N/A	Refurbish / Replace		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
		Oil Filled	Large Power	N/A	Refurbish / Replace		
Inverter	Active	N/A		N/A	Replace		
Instrumentation and Controls							
Circuit Card/ Electronic Module	Active	RPS, ESFAS, ECI, PAM, SRMs/IRMs, Process Instrumentation, Loose Parts, Radiation Monitors, Incore Probes, RPI, Annunciators, Process Computer, Hydrogen Analyzer		New/ Replace	New/ Replace		
		Power Range Nuclear Instrumentation, Valve Monitor, AFW Turbine Speed Controller		N/A	Refurbish		
Condensing Pot	Passive	N/A		N/A	Inspect	1) Inspect for physical damage and presence of foreign material on external.	1) Physical damage
						2) Perform random swipes to verify no chemical contamination.	2) Chemical contamination
Controller	Active	Electronic		N/A	Replace		
		Pneumatic		N/A	Replace / Refurbish		
Fiber Optic Component	Active	N/A		N/A	New		
Diesel Generator	Active	N/A		N/A	Inspect / Test		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Indicator	Active	Electro Mechanical	N/A	N/A	Inspect / Replace	1) Inspect for physical damage, bent needles, damaged case, other.	1) Physical damage
						2) Perform calibration, including hysteresis check.	2) Damaged linkages, open coils, damaged bearings, or corrosion on mechanical parts.
						3) Perform OEM recommendations	3) If applicable - lubrication, etc.
		Electronic	N/A	N/A	Replace		
		Mechanical	N/A	N/A	Inspect / Replace	1) Inspect for physical damage, bent needles, damaged case, and loss of fill fluid, loss of dampening fluid.	1) Physical damage
						2) Perform calibration, including hysteresis check. (If indication is a QA function)	2) Damaged linkages, damaged bearings, corrosion on mechanical parts.
						3) Perform OEM recommendations	3) If applicable - lubrication, etc.
Power Supply	Active	N/A		N/A	Refurbish / Replace		
Radiation Monitor	Active	N/A		Replace	Replace		
Recorder	Active	N/A		N/A	Replace		
Sample Pump	Active	Miscellaneous	N/A	N/A	Refurbish / Replace		
		Radiation Monitor	N/A	N/A	Replace		
Sensors (Bellows, Diaphragms)	Active	N/A		N/A	Refurbish / Replace		

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
Instrument Switch	Active	Electro Mechanical	N/A	Replace	Refurbish / Replace	[redacted]	
		Electronic	N/A	Replace	Refurbish / Replace		
Limit Switch	Active	N/A		Replace	Refurbish / Replace		
Transmitter	Active	N/A		Replace	Replace		
Instrument Air Tubing	Passive	N/A		N/A	Inspect	1) Inspect for physical damage and presence of foreign material on external.	1) Physical damage
						2) Perform swipes to verify no chemical contamination.	2) Chemical contamination
Instrument Sensing Line	Passive	N/A		N/A	Inspect	1) Inspect for physical damage and presence of foreign material on external.	1) Physical damage
						2) Perform swipes to verify no chemical contamination.	2) Chemical contamination
Temperature Element	Active	RTD	N/A	New	Inspect	1) Inspect element for physical damage and fit up.	1) Physical damage, corrosion, and proper installation.
		TC	N/A	N/A	Inspect	1) Inspect element for physical damage and fit up.	1) Physical damage, corrosion, and proper installation.
Pressure Regulator	Active	N/A		Replace	Replace	[redacted]	
Mechanical							
Fan	Active	N/A		N/A	Refurbish	[redacted]	
Cooling Coil	Passive	Dry	N/A	N/A	Inspect	1) Inspect for external physical damage.	1) Physical damage. Corrosion.
						2) Perform swipes, if stainless.	2) Chemical contamination.

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
		Wet	N/A	N/A	Inspect	1) Inspect for external physical damage.	1) Physical damage. Corrosion.
						2) Inspect for internal physical damage.	2) Physical damage. Corrosion.
						3) Perform swipes, if stainless.	3) Chemical contamination.
Chiller	Active	N/A		N/A	Refurbish		
Coating (Protective)	Passive	N/A		N/A	Inspect	1) Visual inspection and pull testing	1) Physical damage. Chipping, peeling, or blistering. Chemical attack.
Compressor	Active	N/A		N/A	In-service		
Control Rod Drive Mechanism	Active	N/A		N/A	Inspect / Test	1) Inspect for physical damage.	1) Physical damage.
						2) Testing of jacking mechanism and RPI sensing, including current signature.	2) Physical damage. Internal contamination and corrosion.
						3) Chemical swipes of accessible areas.	3) Chemical contamination.
Damper	Active	N/A		N/A	Refurbish		
Duct	Passive	N/A		N/A	Inspect	1) Perform inspection	1) Physical damage. Corrosion.
						2) Perform swipes, if stainless.	2) Chemical contamination.
Pipe	Passive	Dry	N/A	N/A	Inspect	1) Perform inspection	1) Physical damage. Corrosion.
						2) Perform swipes, if stainless.	2) Chemical contamination.
						3) For piping external to the building, remove insulation and inspect for external corrosion.	3) Corrosion.
		Wetted	N/A	N/A	Inspect	1) Open piping to inspect to determine extent of wetting and for cleaning.	1) Physical damage. Corrosion.
						2) Perform UT of the piping to determine wall thickness degradation.	2) Physical damage. Corrosion.
						3) Perform chemical swipes of internal and external portions of pipe, if stainless steel.	3) Chemical contamination.
Orifice	Passive	Dry	N/A	N/A	Inspect	1) Inspect for size, serial number, and orientation.	1) N/A
		Wetted	N/A	N/A	Inspect	1) Perform inspection	1) Physical damage. Corrosion.

Category	Active / Passive	Sub Description	Sub Sub Description	Action Required		Pre-service Inspection	Pre-service Degradation Mechanism
				EQ	SR/QR		
							MIC
						2) Inspect for size, serial number, and orientation.	2) N/A
Filter	Passive	N/A		N/A	Replace		
Gear Box	Active	N/A		N/A	Refurbish		
Heat Exchanger	Passive	Dry	N/A	N/A	Inspect	1) Inspect for external physical damage.	1) Physical damage. Corrosion.
						2) Perform swipes, if stainless.	2) Chemical contamination.
		Wetted	N/A	N/A	Inspect	1) Inspect for external physical damage.	1) Physical damage. Corrosion.
						2) Inspect for internal physical damage.	2) Physical damage. Corrosion.
						3) Perform swipes, if stainless.	3) Chemical contamination.
Valve Operator	Active	Motor	N/A	Replace	Replace		
		Air	N/A	N/A	Refurbish		
		Hydraulic	N/A	N/A	Refurbish		
Pressure Regulator	Active	N/A	N/A	N/A	Refurbish / Replace		
Seal	Passive	N/A	N/A	Inspect	Inspect / Replace	1) Inspect for physical damage.	1) Physical damage.
Tank	Passive	Stainless	N/A	N/A	Inspect	1) Inspect for physical damage, corrosion, and chemical attack.	1) Physical damage. Corrosion. Chemical attack.
						2) Perform swipes, if stainless.	2) Chemical contamination.
		Coated	N/A	N/A	Inspect	1) Inspect for physical damage and corrosion. Pull tests.	1) Physical damage. Corrosion. Failed coatings.
Pump	Active	N/A	N/A	N/A	Refurbish		
Turbine	Active	N/A	N/A	N/A	Refurbish		
Valve	Active	Unisolatable, Radioactive Fluid, High Pressure, High Temperature (High risk)		N/A	Refurbish		
		Other Valves (Low risk)	N/A	N/A	Inspect / Refurbish	1) Inspect for physical damage.	1) Physical damage. Corrosion.
						2) Check for binding	2) Physical damage. Hardened organic components.
						3) Leak check	3) Hardened packing and organic components.