

**Independent Oversight Review of the  
Long Lead Procurement Processes Used by  
Babcock & Wilcox Technical Services Y-12, LLC  
for the  
Uranium Processing Facility Project**



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**Office of Safety and Emergency Management Evaluations  
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## Acronyms

ASME	American Society of Mechanical Engineers
BAPS	Bechtel Acquisition and Procurement System
BTP	Baseline Training Program
B&W Y-12	Babcock & Wilcox Technical Services Y-12, LLC
CD	Critical Decision
CFR	Code of Federal Regulations
CGD	Commercial Grade Dedication
CRAD	Criteria, Review, and Approach Document
CSE	Cognizant System Engineer
DOE	U.S. Department of Energy
ESL	Evaluated Suppliers List
HS-45	Office of Safety and Emergency Management Evaluations
HSS	Office of Health, Safety and Security
MR	Material Requisitions
NNSA	National Nuclear Security Administration
NQA-1	ASME Nuclear Quality Assurance Requirements
OFI	Opportunities for Improvement
PQM	Procurement Quality Manual
PSDR	Preliminary Safety Design Report
Q	Quality
QA	Quality Assurance
QAP	Quality Assurance Plan for the Uranium Processing Facility
QC	Quality Control
QL	Quality Level
QPD	Quality Program Description
RAM	Reliability, Availability, and Maintainability
S/CI	Suspect/Counterfeit Items
SSC	Structures, Systems, and Components
TEAP	Technical Evaluation and Acceptance Plan
UPF	Uranium Processing Facility
USQ	Unreviewed Safety Question
USQD	Unreviewed Safety Question Determination

# **Independent Oversight Review of the Long Lead Procurement Processes Used by Babcock & Wilcox Y-12, LLC for the Uranium Processing Facility Project**

## **1.0 Purpose**

The Uranium Processing Facility (UPF) project is intended to build a facility to replace the existing aging facilities and consolidate uranium operations at the National Nuclear Security Administration (NNSA) Y-12 National Security Complex. This independent review assessed the effectiveness and maturity of procurement processes used by the main site contractor, Babcock & Wilcox Technical Services Y-12, LLC (B&W Y-12) for acquisition of safety related items, components, and services needed for the construction and eventual operation of the new facility.

## **2.0 Scope**

This independent review was conducted by the Office of Enforcement and Oversight (Independent Oversight), which is within the Office of Health, Safety and Security (HSS). The review was performed by the Independent Oversight's Office of Safety and Emergency Management Evaluations (HS-45). The independent review team used HSS criteria, review, and approach document (CRAD) 45-12, rev 1, dated June 29, 2011, as the basis for the review. The CRAD is divided into ten aspects of the procurement process:

- I. Establishing a Well-Documented Procurement Program
- II. Identifying Safety Components and Defining Technical and Quality Requirements
- III. Identifying Qualified Vendors
- IV. Qualifying Items and Services for Safety-Related Applications
- V. Performing Source and Receipt Inspections To Verify Quality
- VI. Storing the Items in a Manner That Preserves Their Integrity
- VII. Tracking and Tracing the Items Through Their Lifecycle
- VIII. Preventing Use of Suspect/Counterfeit Items (S/CI)
- IX. Applying System Engineer Oversight To Ensure Safety System Operability and Reliability
- X. Performing Assessments to Ensure That the Procurement Program Is Functioning as Intended.

At the time of this review, the facility safety basis had not yet been approved, the quality assurance (QA) organization required to implement certain procurement program requirements had not been fully staffed and trained, and no safety related components had been procured. Consequently, it was not possible to verify the adequacy of performance of the procurement processes outlined in Sections III through X of the CRAD. The review concentrated on assessing the adequacy of the UPF's written procurement program for nuclear safety related components and services.

## **3.0 Background**

The Y-12 site, located in Oak Ridge, Tennessee, was established during the Manhattan Project, primarily for uranium materials processes. Portions of the existing facility have remained in service since that time. The UPF project is intended to consolidate many of these manufacturing operations into a smaller footprint and replace the existing facilities. It is anticipated that significant improvements in process technology and safety will be incorporated into the design of the UPF.

The project is currently beyond the Critical Decision (CD) 1 approval level and has progressed through many of the conceptual design milestones. The initial draft of the preliminary safety design report (PSDR) was submitted by the contractor for review by NNSA and returned with comments; the project has not yet reached CD 2/3 approval and is not yet authorized to complete acquisition of safety related long lead procurements. Some non-safety related long lead procurements for site preparation and infrastructure have been allowed. Draft specifications have been prepared for some safety related items that do not appear to be impacted by the comments on the draft PSDR, but to date no safety related components have been procured.

#### **4.0 Results**

The UPF project has committed to follow Department of Energy (DOE) Standard 1189, *Integration of Safety into the Design Process*. At the time of this review, unresolved issues remained in the draft PSDR and associated Hazard Analysis, and the project did not yet have a complete basis for determining the system safety requirements necessary to move to the CD 2/3 level. The HS-45 team assessed the adequacy of the written UPF procurement program for nuclear safety related structures, systems, and components (SSC) and services using the criteria outlined in HSS CRAD 45-12, rev 1. As noted, no acquisitions of safety related components have been completed to date, so the review could not determine the effectiveness of the written procedures in practice. The following discussion addresses each of the aspects of the CRAD to the extent to which the project has progressed.

The review determined that the UPF program for procurement of nuclear safety related items and services is comprehensive and conforms to the requirements of Title 10 Code of Federal Regulations (CFR) Part 830, Subpart A, *Quality Assurance Requirements*, and DOE Order 414.1C, *Quality Assurance*. The UPF procurement program is defined by the *B&W Y-12 Quality Program Description (QPD)*, the *B&W Y-12 Procurement Quality Manual (PQM)*, the *Quality Assurance Plan for the Uranium Processing Facility (QAP)*, and implementing procedures and guides. The QPD, PQM, and QAP also incorporate application of American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*, Part 1 and Part 2, and the commercial grade dedication (CGD) provisions outlined in the 2009 Addendum. The *Requirements Crosswalk for UPF QAP* references specific implementing procedures indexed to the specific requirements in the UPF QAP. Guides such as DG-EG-801768-A002, *UPF Specification Writer's Design Guide*, also amplify and explain Engineering and Quality Assurance management expectations for the development of procurement related documentation. Responsibilities, authorities, and the organizational structure for procurement of safety related equipment, materials, and services are also appropriately established, as are requirements to flow down applicable regulations, contractor requirements, and applicable specifications, codes, and standards to all tiers of their subcontractors and suppliers.

The UPF procurement processes also integrate requirements to facilitate maintaining the reliability and availability of safety related equipment, as required by DOE Order 433.1, by requiring sellers to identify spare and replacement parts or assemblies and the related data required for ordering these parts or assemblies.

Although the UPF project has established a training program compliant with the QPD, staff training in some assigned procurement responsibilities did not appear to be adequate to ensure proficiency. The processes for determining required staff training as outlined by the QPD and the Training Plan for the Uranium Processing Facility Project were implemented; however, in interviews of several design engineers responsible for developing safety related equipment procurement specifications, they did not demonstrate a uniform understanding of the requirements of the *UPF Equipment Specifications* procedure

and the guidance provided by the *UPF Specification Writer's Guide*. Training on the requirements of the procedure, as amplified by the guide, were not part of the interviewed staff's "required" training plans. Additional training of individuals responsible for the development, review, and approval of procurement specifications would help to ensure competence in performance consistent with assigned responsibilities.

The UPF project team has established a comprehensive programmatic process for translating safety basis design parameters into procurement specifications. Although the UPF safety basis has not yet been approved, the HSS team reviewed three draft safety related procurement specifications to assess the adequacy of implementation of UPF procurement program requirements and provide feedback on performance to the UPF team. The reviewed draft specifications were found to meet procurement program requirements for format and content, essential QA requirements, requirements to be imposed on the seller, tests and inspections to be performed, and the documentation of results to be provided. The reviewed specifications also identified applicable codes and standards, specific SSC design performance requirements, unique safety features, materials of construction, seismic design criteria, and non-destructive examinations and performance testing requirements with associated acceptance criteria. However, since the PSDR and associated safety analysis have unresolved technical issues and have not yet been approved, no safety related procurements can yet be performed. A clear definition of the safety basis requirements and approval of the safety basis are essential before significant procurement can be performed. The draft specifications will need to be reviewed and reconciled with the requirements in the safety basis documents when they are approved.

The written program for identifying qualified vendors and suppliers has been developed and appears mature. The system recognizes that for some procurement, it may not be economically feasible to rely upon procurement from ASME Nuclear Quality Assurance Requirements (NQA-1) certified vendors. In these cases, the procurement process identifies the CGD processes and necessary reviews, inspections, and approvals required to accept procured safety-related SSC from uncertified vendors. The procedures also include requirements to flow down the QA requirements to sub-tier suppliers. However, the B&W Y-12 *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements* procedure includes reference to a superseded procedure for placing a vendor on the facility's Evaluated Suppliers List (ESL) (See Opportunities for Improvement (OFI) – 4).

UPF procurement program procedures requiring qualification, certification, inspection, and testing of safety related components during manufacturing and following receipt are well developed. The processes depend heavily on development of Technical Evaluation and Acceptance Plans (TEAPs) by design engineers and procurement engineers that will be implemented by the QA organization. The procedures require inclusion of the TEAPs in the request for proposal or solicitations portion of the procurement process to inform the potential supplier of the UPF requirements for acceptance of the procured item. The procedures address inclusion of required vendor-supplied documentation as part of the bid responses to assure the basis for evaluation and qualification of the items or services.

Due to the current project status, the infrastructure for material control, traceability, storage, and release for construction has not yet been established. Although planning is under way, the receiving, storage, and staging areas have not yet been prepared. Portions of the QA organization are in place to support the existing Y-12 facilities, but most of the personnel who will perform the QA receipt inspections, maintain the warehousing and storage areas, and release material for construction of the UPF project have not yet been hired and trained. The written procedures adequately address the requirements for storage and maintenance prior to installation based on the quality level of the items and the vendor-supplied instructions. The written procedures adequately address the issuance of stored items to field personnel for installation or use. Written procedures address the inventory and QA documentation tracking requirements for the project, as well as personnel roles and responsibilities for maintenance, storage, and inventory control. The Bechtel Acquisition and Procurement System (BAPS) system appears to be

capable of providing the information system infrastructure to assure tracking and trending of lifecycle reliability of safety related components and replacement parts. Given the status of the project, it was not possible to review a demonstrated application of the UPF procedures or UPF's use of the BAPS system.

The UPF procedures applicable to S/CI are a subset of the procedures written to address any non-conforming items or services. Procedures appropriately requiring prohibitions against and inspections for S/CI are incorporated into procurement documents and flow down to sub-tier suppliers. The procedures appropriately address inspection, segregation, disposition, and reporting requirements for all non-conformances, and specifically for S/CI. The status of the project did not allow a review of the application of these procedures or an assessment of the adequacy of training for the personnel who will perform the evaluation and acceptance of procured items.

To date, the project has not assigned Cognizant System Engineers (CSEs) to each of the safety significant systems in the design. The project engineer coordinates the process with the design engineers taking the lead on design. The design and system requirements are then conveyed to the procurement engineers, who draft the specifications and solicitation packages (including the TEAP) in consultation with a variety of subject matter experts, including operations engineers who work with analogous systems in the existing facilities. The process is then transferred to a source selection team that evaluates the prospective supplier's offerings. Following source selection, the package is transferred to the QA organization for manufacturing inspection and source receipt inspection. If the material or SSC is approved as received by the QA organization, it is managed by the superintendent responsible for storage and inventory control until it is released to the field engineers for installation and testing. However, this process lacks a clearly understood "ownership" of the system throughout, which would be a hallmark of the CSE system. (See OFI-2).

Finally, procedures have been developed that generically address the framework of an audit and assessment process for all aspects of the project. However, because the procurement process has not been fully implemented, no internal audits or management assessments of the UPF specifically targeted toward the procurement process have been conducted. The management assessment process has been implemented for other aspects of the project, as evidenced by HSS's observation of a pre-Technical Independent Project Review out brief.

## **5.0 Conclusions**

At the time of this review, unresolved issues remained in the draft PSDR and associated Hazard Analysis, and the project did not yet have a complete basis for determining the system safety requirements necessary to move to the CD 2/3 level. No procurement of safety related components or services can be authorized until these issues are resolved. Any preliminary development of safety related procurement specifications will require review and reconciliation with the final approved safety basis requirements before proceeding to solicitations.

This review determined that a comprehensive written procurement program has been established to govern the full range of the procurement process, including: translation of system requirements into design and procurement specifications; qualification of suppliers; source and item evaluation and selection; QA inspection and testing during manufacturing, upon receipt, and post installation for acceptance; storage and maintenance following receipt; lifetime inventory control and performance/degradation tracking; prevention of S/CI; and assessment of the integrity/functionality of the procurement process. Much of the written program draws from B&W Y-12's experience with similar previous projects and current operations. The written program appears to adequately address all critical components of the procurement process and satisfy the regulatory and contractual requirements for the program.

At the time of this report, the status of the project precluded implementation of the procurement process for safety related components or services. Much of the infrastructure and staffing needed to support the full range of the procurement process was not yet in place, so it was not possible to assess the implementation of the written program.

## **6.0 Opportunities for Improvement**

This Independent Oversight review identified the following opportunities for improvement (OFIs). These potential enhancements are not intended to be prescriptive or mandatory. Rather, the OFIs are offered to the site to be considered. The responsible site line management should review and evaluate these OFIs and accepted, rejected, or modified as appropriate, in accordance with site-specific objectives and priorities.

**OFI-1:** In accordance with DOE Standard 1189, the site office and project team are working to resolve the outstanding issues in the safety basis to assure clear identification of safety related system requirements. This effort is critical to assure the integration and interface of all the separate systems with the facility infrastructure for such issues as heating, ventilation, and air conditioning; effluent controls; fire protection systems; structural and piping seismic restraints; and criticality. This effort must be completed for design to progress.

**OFI-2:** B&W Y-12 should consider expediting implementation of the CSE program of system ownership to ensure safety system operability, reliability, and configuration management throughout the design, procurement, installation, testing, and operational phases of the facility.

**OFI-3:** B&W Y-12 should consider requiring the staff assigned responsibility for developing safety-related equipment procurement specification be trained in the requirements of the *UPF Equipment Specifications* procedure and the guidance provided by the *UPF Specification Writer's Guide*.

**OFI-4:** Consider updating the B&W Y-12 *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements* procedure by removing reference to procedure Y60-89-003, *Supplier Evaluations*, which was superseded by the PQM.

## **7.0 Follow-up Items**

After the project has received approval to proceed with acquisition of safety related items and services and established the source receipt and storage infrastructure, HSS should perform a follow-up assessment of the implementation of the written program.



## **Appendix A Supplemental Information**

### **Dates of Review**

Onsite Scoping and Initial Document Review: October 17-21, 2011  
Onsite Review: February 27 – March 2, 2012

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## **Appendix B**

### **CRAD-Specific Lines of Inquiry Results and Documents Reviewed**

Documents reviewed for each section are listed at the end of this appendix.

#### **I. Establishing a Well-Documented Procurement Program**

The inspection criteria for this section of the CRAD are as follows:

- Processes, procedures, requirements, and resources have been established and implemented for procuring safety related items and services to ensure that they meet established requirements, will perform as specified, and are appropriate to the intended application. Reference Title 10 830.1, 10 CFR 830.122, and U.S. DOE Order 414.1D, Criteria 1, 4, and 7; ASME NQA-1-2000, Requirements 4 and 5; 48 CFR 970.5204-2 and 970.5223-1.
- Responsibilities, authorities, and the organizational structures for the procurement of safety equipment, materials, and services are established by formal (written) procedures. Reference 10 CFR 830.122 and DOE Order 414.1D, Criterion 1.
- Training and qualification programs shall be established to ensure that staffs involved in procurement activities are proficient in discharging assigned responsibilities. Reference 10 CFR 830.122 and DOE Order 414.ID, Criterion 2; NQA-1-2000, Requirement 2.

The written policies and procedures governing the procurement processes used by B&W Y-12 and intended for use in the UPF project were reviewed against these inspection criteria.

The UPF program for procurement of safety related items and services is comprehensive and conforms to the requirements of 10 CFR 830, Subpart A, *Quality Assurance Requirements*, and DOE Order 414.1C, *Quality Assurance*. The UPF procurement program is defined by the *B&W Y-12 Quality Program Description (QPD)*, the *B&W Y-12 Procurement Quality Manual (PQM)*, the *Quality Assurance Plan for the Uranium Processing Facility (QAP)*, and implementing procedures and guides. The QPD, PQM, and QAP also incorporate application of ASME NQA-1-2008, *Quality Assurance Requirements for Nuclear Facility Applications*, Part 1 and Part 2, and the CGD provisions outlined in the 2009 Addendum. The *Requirements Crosswalk for UPF QAP* references specific implementing procedures indexed to the specific requirements in the UPF QAP. Guides, such as DG-EG-801768-A002, *UPF Specification Writer's Design Guide*, also amplify and explain Engineering and Quality Assurance management expectations for the development of procurement related documentation.

UPF programs, manuals, plans, implementing procedures, and guides include appropriate provisions for procurement of safety related items and services. Listed by function, these documents include, but are not limited to:

- *B&W Y-12 Graded Approach to Quality* procedure for determining item or service procurement quality level
- *B&W Y-12 Design, Design Review, Design Verification and UPF Design Analyses and Calculations* procedures for design implementation,
- *B&W Y-12 Quality Program Description*, establishing the Y-12 requirements for configuration management
- *UPF Supplier Quality Manual*, establishing requirements for supplier qualification
- *B&W Y-12 Commercial Grade Dedication Packages for the UPF Project*, for component dedication

- *B&W Y-12 Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements, Functional Acceptance Criteria and UPF Seller Engineering and Quality Verification Documents for the UPF Project* procedures for source and receipt inspection
- *B&W Y-12 UPF Material Receiving, UPF Field Material Storage Control, UPF Field Material Control and Traceability and UPF Field Material Withdrawal* procedures for storage and maintenance
- *B&W Y-12 Records and Controlled Documents and UPF Document Management* procedures for document management
- *B&W Y-12 UPF Construction Nonconformance Reporting and Control and Suspect and Counterfeit Item Control Program* procedures and *Operations Standing Order for Identifying S/CI Item Controls in Y18-012* address control of non-conforming and S/CI
- Involvement of the CSE in safety-related procurements (not yet defined, awaiting the establishment and manning of a CSE program)
- *B&W Y-12 UPF Equipment Specifications* procedure for equipment specifications review and approval
- *B&W Y-12 Management Assessment and Conduct of UPF Project Internal Quality Assurance Audits* procedures for program assessment activities.

UPF procurement processes are appropriately integrated with the requirement to maintain the reliability and availability of safety related equipment, as required by DOE Order 433.1, by ensuring the availability of appropriate spare parts, materials and services. NQA-1-2008 indicates that procurement documents shall specify the supplier's requirements to identify spare and replacement parts or assemblies and the related data required for ordering these parts or assemblies, and B&W Y-12 *Basic Procurement Instructions* contains these requirements. The *B&W Y-12 UPF Equipment Specifications* procedure requires that Section 3 of the Equipment Specification include essential requirements for performance, design, service conditions, fabrication and assembly, installation, reliability, etc. The procedure also requires Section 3 to identify deliverables; document and data submittal requirements; and handling, receiving, storage, and identification requirements. The *UPF Specification Writer's Design Guide* defines the reliability, availability, and maintainability (RAM) requirements that should be included in Section 3 of the Equipment Specification based on agreement between the RAM engineer and the design team using cost-benefit considerations. The guide states that "maintainability" is the ability of a system to be repaired and returned to full service once it has experienced a failure, based on the accessibility of failed components and the availability of replacement parts. The guide lists examples of Section 3 requirements that should be considered, including: "The Seller is to supply a list of spare parts indicating which parts should be maintained in on-site stores and how many of each" and "The Seller is to supply a list of components and assemblies which require special ordering or off-site fabrication." The *UPF Material Requisition* procedure covers UPF engineering activities related to the creation and change management of Material Requisitions (MR) and related documents that convey Engineering instructions to Procurement. The MR Scope of Work section identifies the required work scope, and includes requirements for a seller's representative to specify spare parts, alternatives, or options. These and other Engineering, Quality Assurance, and Procurement procedures, once implemented, will ensure that appropriate spare parts are identified and, where appropriate, procured and stocked.

Responsibilities, authorities, and the organizational structure for procurement of safety related equipment, materials, and services are appropriately established in the B&W Y-12 QPD, B&W Y-12 PQM, UPF QAP, and implementing procedures discussed above and in later sections of this report, and in the Y-12 UPF organization charts.

The B&W Y-12 QPD, B&W Y-12 PQM, and UPF QAP require flow down of applicable regulations, contractor requirements, and applicable specifications, codes, and standards to all tiers of their subcontractors and suppliers. The QPD states, in part, that "for work that is subcontracted, management

requirement documents shall ensure employees establish and manage procurements that effectively flow down the B&W Y-12 quality assurance program requirements. Subcontract clauses, specifications, etc., specify the requirements applicable to the scope of work and mandate their flow down to all tiers of subcontractor employees.” The PQM requires, in part, that if the work will be performed using the supplier’s quality assurance (QA) plan, then the sub-tier procurement documents shall flow down the quality requirements defined in the originating purchase document to all sub-tier suppliers and subcontractors verbatim, as applicable to the work being performed by the sub-tier suppliers or subcontractors.

UPF program manuals, plans, implementing procedures, and guides appropriately require Section 3 and Section 4 of Equipment Procurement Specifications to contain all technical, documentation, and QA requirements to be imposed on the seller. The *B&W Y-12 UPF Equipment Specifications* procedure encompasses a roll down of procurement specification requirements from the B&W Y-12 QPD, B&W Y-12 PQM, and UPF QAP. The procedure requires development of the Equipment Specification using the *UPF Specification Writer’s Design Guide*. The guide indicates that Section 3 of the specification should include essential technical requirements that must be met, including: design and performance requirements that are consistent with the safety basis, physical, interface, materials, welding, environmental, hazardous chemical, and cleanliness technical requirements, codes, and standards; and interchangeability, reliability, availability, and maintainability requirements. The guide also indicates that Section 4 of the specification should include essential QA requirements, including: the management control and QA requirements to be imposed on the seller; the tests and inspections to be performed and the documentation of results to be provided; the B&W Y-12 UPF criteria for acceptance of the item or service; the seller’s responsibility for the quality of procured items; and, where applicable, the requirement for the seller to provide the services of a technical representative to supervise assembly, installation, startup, and troubleshooting of the equipment/item. Finally, the B&W Y-12 QPD, B&W PQM, and UPF QAP provide a defined evaluation process for selecting a supplier of safety related items or services who is not qualified to be listed on the B&W Y-12 ESL using CGD provisions.

Although the UPF project has established and implemented a training program compliant with the B&W Y-12 QPD, staff proficiency in some assigned procurement responsibilities has not been specifically addressed by training. The B&W Y-12 QPD states that “Management shall be responsible for determining the procedures necessary for the scope of assigned work and shall ensure individuals assigned the work are trained on those procedures.” The QPD also states that B&W Y-12 line management, supported by the Y-12 Training Management and Delivery Organization, is responsible for ensuring that personnel are trained and qualified to safely perform their assigned duties. Training programs shall be designed so that the employee understands “the processes and procedures necessary to conduct the assigned tasks.” The *Training Plan for the Uranium Processing Facility (UPF) Project* requires management to determine training requirements for their staff. Supervisors establish individual staff member training programs by completing and gaining training staff concurrence on a UPF Baseline Training Program (BTP) Analysis and Approval Checklist. The Training Plan also indicates that Form UCN-20631, *Training Impact Assessment*, will be used to document the target audience for plant-wide procedures. Form UCN-23013, *UPF Training Impact Assessment*, will be used to document the target audience for UPF-specific documents, including Engineering Design Standards, Desktop Work Instructions, Design Guides, and other documents, as required. Reviewed Training Impact Assessment and UPF Training Impact Assessment forms indicated that project required reading (training) was required for some procurement program implementing procedures, such as CGD packages; however, the reviewed forms did not require engineering staff training on new or revised procedures for *UPF Equipment Specifications*, *UPF Specification Writer’s Guide*, and *Seller Engineering and Quality Verification Documents for the UPF Project*. Even when training was not required, a Procedure/Document Awareness e-mail was sent to notify the project staff of the issuance of the new or revised procedure/document, as required by the completed Training Impact Assessment forms. Although

the processes for determining required staff training (as outlined by the B&W Y-12 QPD and the *Training Plan for the Uranium Processing Facility Project*) were implemented, limited interviews with several design engineers responsible for developing safety-related equipment procurement specifications did not demonstrate a uniform understanding of the requirements of the *UPF Equipment Specifications* procedure and the guidance provided by the *UPF Specification Writer's Guide*.

## II. Identifying Safety Components and Defining Technical and Quality Requirements

The inspection criteria for this section of the CRAD are as follows:

- Purchase orders identify applicable regulations and contractor requirements, required functional and performance characteristics, and technical and QA requirements that must be met to ensure that the procured safety related items, software, or services are appropriate for their intended application. Reference 10 CFR 830.1, 10 CFR 830.122, and DOE Order 414.1D, Criteria 4 and 7; DOE Order 414.1.C, Attachment 2, Section 5; NQA-1-2000, Requirements 3 and 4; NQA-1-2000, Part IV, Subpart 4.1; 48 CFR 970.5204-2 and 5223-1.
- Configuration management is used to develop and maintain consistency among system requirements and performance criteria, documentation, and physical configuration for SSC. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 6 and 7; 10 CFR 830.201 and 202; NQA-1-2000, Requirement 3.
- Changes to system requirements, documents, and installed components are formally designed, reviewed, evaluated under the facility's unreviewed safety question (USQ) processes, approved, and appropriately documented. Reference 10 CFR 830.122 and DOE Order 414.ID, Criteria 4 and 6; 10 CFR 830.203; NQA-1-2000, Requirements 3, 6, and 11.

The written process for accurately and effectively preparing procurement specifications for UPF SSC was reviewed. Specifically, this portion of the review was intended to assure that a process was in place to accurately translate the safety basis functional, performance, and design requirements for SSC into procurement specifications. Processes are needed to specify appropriate design parameters in accordance with the safety basis, design specifications and the System Design Document; identify applicable functional and performance characteristics and technical and QA requirements, such as codes and standards; and specify procurement from an approved (evaluated) supplier. Three draft specifications were selected as examples of implementation of the process. Interviews were conducted with B&W Y-12 personnel and contractors associated with the development of those specifications to assess the implementation of the written procedures. The resulting observations are discussed below.

The UPF has established a comprehensive programmatic process for translating safety basis design parameters into procurement specifications. B&W procedure Y17-95-69-310, *UPF Equipment Specifications*, serves as the basis document that establishes the requirements and responsibilities for preparation, review, and approval of equipment specifications. Source requirements for this procedure stem from the B&W Y-12 QPD; B&W Y-12 PQM; the UPF QAP; DG-EG-801768-A002, *UPF Specification Writer's Design Guide*; and procedure Y30-803, *Procurement Specification Manual*, which establishes the process used to identify the functional, technical, and quality requirements associated with an item or service that is to be obtained through a procurement activity. Procedure Y17-95-69-310 is compliant with the intent of procedure Y30-803 and the *UPF Specification Writer's Design Guide*. The above-referenced source documents flow down the requirements and essential technical characteristics and capabilities that must be delineated, including: the design and performance requirements that are consistent with the safety basis; identification of SSC boundary interface, materials of construction, welding requirements, environmental, hazardous chemical, and cleanliness technical requirements; codes

and standards; and interchangeability, reliability, and maintainability requirements. Roles and responsibilities for project key personnel are adequately defined by this procedure. For SSC designated as Quality Level Q, preparation of project procurement specifications in conjunction with procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*, is prescribed.

The representative sample of three procurement specifications showed the use of an appropriate template based on the process requirements. Specific SSC design performance requirements were clearly defined, materials of construction were appropriately identified, and unique safety features, seismic design criteria, non-destructive examinations, and performance testing requirements with associated acceptance criteria were identified and appropriate. A comprehensive listing of applicable codes and standards was provided. Consistent with procedural requirements, the specifications included essential QA requirements, including the QA requirements to be imposed on the seller, the tests and inspections to be performed, and the documentation of results to be provided. As part of the preparation of procurement specifications, inter-discipline design reviews consistent with procedure Y17-69-324, *Design Reviews*, were performed. This procedure applies to design documents that are prepared for a project/task and that support the design, procurement, construction, modification, and operation of SSC at Y-12. Examples of design review forms for the specifications reviewed demonstrated a thorough multi-discipline review and a corresponding comment resolution process.

The review of the three specifications led to the conclusion that a supplier would have sufficient information regarding the scope and requirements to fulfill the intent of the procurement specification.

The UPF PSDR and the Preliminary Fire Hazard Analysis (PFHA) currently serve as the safety basis inputs to the procurement specifications. However, these documents are currently unapproved, and technical issues exist. Consequently, the adequacy of the translation of criteria from the safety basis to the procurement specifications could only be generally reviewed. The review team recognizes that the current version of the procurement specifications must be reconciled with the safety basis technical content once the safety basis deficiencies have been addressed and approved. During the development and implementation of revisions of the safety basis documents, the process for appropriate translation of the safety basis is assured by procedure Y15-005, *Technical Change Control Process for Projects*. This procedure describes the technical change control process, which ensures that technical changes are properly identified, reviewed, dispositioned, approved, documented, and distributed to appropriate personnel from design through the installation phase. Change control during design is intended to focus on significant technical basis documents, as determined by using the phased approach in Y17-009, *Establishing and Maintaining the Technical Basis*.

### **III. Identifying Qualified Vendors**

The inspection criterion for this section of the CRAD is as follows:

- Processes have been established and implemented that ensure that approved suppliers meet specified criteria and continue to provide acceptable items and services for safety related SSC. Reference 10 CFR 830.122 and DOE Order 414.1D, Criterion 7; NQA-1-2000, Requirements 5 and 7.

In general, prospective suppliers are evaluated for inclusion on a site/facility (Approved) ESL against established criteria. The B&W Y-12 *Procurement Quality Manual (PQM)* requires evaluation of prospective suppliers of nuclear safety-related equipment and services, and confirmation of acceptability using PQM-established processes and criteria as the basis for including a prospective supplier on the ESL. The PQM details the roles, responsibilities, processes, criteria, and authorities for requesting, evaluating, and approving the inclusion and continued listing of prospective suppliers on the B&W Y-12 ESL.

B&W Y-12 procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*, indicates that either procedure Y60-89-003, *Supplier Evaluations*, or (for the UPF project) procedure Y60-95-811, *Supplier Quality Manual*, should be used for adding a supplier to the respective ESL. However, since procedure Y60-89-003, *Supplier Evaluations*, has been superseded by the PQM, it should not be referred to in procedure Y15-910. In the absence of procedure Y60-89-003, the *UPF Supplier Quality Manual* details the roles, responsibilities, processes, criteria, and authorities for requesting, evaluating, and approving the inclusion and continued listing of prospective suppliers on the UPF ESL. At the time of this assessment, the procurement process for nuclear safety-related equipment had not advanced to the point of final selection of suppliers, and no supplier evaluations were available for review.

Procurement documents require suppliers to have a program consistent with the applicable requirements of ASME NQA-1-2008 (with the 2009 addenda) or another acceptable standard, as required by DOE Order 414.ID. The B&W Y-12 QPD and PQM require procurement of nuclear safety-related equipment and services from suppliers with QA programs that conform to ASME NQA-1-2008 requirements, where supplier provisions are established to ensure implementation of the B&W Y-12 QPD requirements applicable to the procurement, or where CGD requirements for the equipment or services are effectively implemented. The QPD and the PQM define the process for procurement from a supplier listed on the ESL. However, the QPD and PQM also allow procurement from a supplier who cannot qualify for ESL listing if seller provisions can be established to ensure implementation of the B&W Y-12 QPD requirements applicable to the procurement, prior to the start of work.

If vendors assemble components from unapproved suppliers, the vendors are required to establish and implement an appropriate CGD process. When NQA-1 qualified sub-tier component suppliers are not available or cost effective, nuclear safety-related equipment and services can be procured from prospective suppliers of commercial grade items and services if they satisfy the provisions of the B&W Y-12 *Commercial-Grade Survey of Supplier, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements* and *Commercial Grade Dedication Packages for the UPF Project* procedures. The B&W Y-12 procurement program requires suppliers who assemble components from sub-tier suppliers to implement effective CGD processes and, where appropriate, to have those suppliers implement CGD processes. The B&W Y-12 PQM defines the roles, responsibilities, processes, criteria, and authorities for planning, developing, and approving nuclear safety-related quality (Q) procurement documents. For Q procurements where the supplier will perform work under the provision of their NQA-1 compliant QA program, the design engineer, with the assistance of the procurement quality engineer, will select the applicable quality requirements based on the activities being performed and will include the elements selected in the procurement documents. For NQA-1 compliant suppliers using subcontracting/purchasing items or services, the PQM requires those required elements to include procurement document control, control of procured items and services, inspection, etc., as appropriate to the procured item or service. The B&W Y-12 *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements* procedure requires implementation of the B&W Y-12 *Commercial Grade Survey of Supplier* procedure for evaluation of prospective commercial grade suppliers. The latter procedure requires the use of the Commercial Grade Survey Checklist and, where appropriate, the Supplier Capability Survey to determine the acceptability of the supplier for CGD procurements. The Commercial Grade Survey Checklist form requires review and confirmation of the adequacy of the supplier's provisions (e.g., commercial grade surveys, source verifications, material verification, and receipt inspection) for controlling critical characteristics of items, material, and/or services provided by sub-tier suppliers. The Supplier Capability Survey form requires review and determination of the adequacy of the supplier's provisions for the control of purchased material, equipment, and services, including conformance of purchased items and services to procurement documents; evaluation and selection of subcontractors, suppliers, or manufacturers; source inspection or audit; inspection of

purchased items on receipt; documented evidence of conformance; assessment of supplier quality-related activities; and commercial grade item dedication.

The performance of approved suppliers is required to be subject to in-process surveillances and periodic audits to verify their capability to continue to provide acceptable items and services. The B&W Y-12 PQM requires periodic audits and re-evaluations of approved suppliers of nuclear safety-related items and services to verify the supplier's continued capability to provide acceptable items and services. It also requires verification of the supplier's surveillance activities to verify conformance to the requirements of the QA program, as specified in the procurement's Technical Evaluation and Acceptance Plan (TEAP). This plan is developed in accordance with the B&W Y-12 *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements* procedure.

Identified deficiencies in supplier performance or programs are required to be documented, trended, and appropriately resolved, either through corrective action or removal of the supplier from the ESL. The B&W Y-12 PQM requires the documentation of deficiencies in supplier performance, programs or supplied equipment; the development and approval of corrective action plans; consideration of removal from the ESL; and verification of the effectiveness of resolution to ensure the acceptability of procured items and services. The PQM requires documentation of the results of evaluations, audits, and surveillances; source verifications; receipt inspections; tests performed as a part of the procurement process, including identified deficiencies in supplier performance, programs, or supplied equipment or services; and supplier-identified departures from their QA program and deviations from the technical or quality requirements specified in procurement documents. The PQM requires B&W Y-12 to evaluate the adequacy of corrective actions planned or taken, and to determine whether further corrective action is necessary to ensure that the equipment or services to be provided are acceptable. The PQM also states that the supplier should be re-evaluated earlier than the rescheduled date whenever:

- Significant changes are made in the scope of functional areas of the supplier's program, such as significant reorganization or procedure revisions.
- It is suspected that the safety, performance, or reliability of the item is in jeopardy due to deficiencies in the QA program.
- An independent assessment of a supplier indicates that its QAP is suspect.
- It is considered necessary to verify the implementation of corrective action(s) imposed on the supplier as a result of previous evaluation.
- A declining trend in the quality performance of a supplier is identified.

#### **IV. Qualifying Items and Services for Safety-Related Applications**

The inspection criteria for this section of the CRAD are as follows:

- Procedures and processes have been established and implemented to procure and dedicate (qualify) equivalent, like-for-like, fabricated, or commercial grade items for use in safety related applications. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 4, 6, 7, and 8; NQA-1- 2000, Requirements 3, 4, 5, 7, 9, and 11; NQA-1-2000, Part III, Subpart 3.1, Appendix 7.A-2.
- Procedures and processes have been established and implemented to procure and verify that services provided by unapproved suppliers are acceptable for safety-related applications. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 4, 6, 7, and 8; NQA-1-2000, Requirements 5, 7, and 9.

The facility has a defined procedure and assignment of responsibilities for procurement and dedication (qualification) of equivalent, like-for-like, fabricated, or commercial grade items for use in safety-related applications. Procedure Y15-95-910, *Commercial Grade Dedication Packages for the UPF Project*,



provides a detailed description of the roles and responsibilities for performing CGD procurements. This process places significant responsibility/authority with the nuclear procurement engineer who initiates the process. It requires a strong technical basis for determining the Q level, related applications, and consequences of failure of the procured component. The initial determination is based in part on the Technical Basis Index Summary and systems requirements document prepared by the project engineer and used by the design engineers. In practice, preparation of the specifications, including the acceptance and testing criteria, requires significant input from subject matter experts as part of an integrated procurement team. These teams typically include engineers using similar components in the existing facility, as well as QA inspectors.

The procedures require a USQ-like screening/determination and review and approval by the design authority and those potentially impacted by installation of new items to be procured. USQ determinations, rather than screening, are always required except for like-for-like procurements. Given the status of the project, procurements are generally not for replacement of existing like-for-like items; all currently planned procurements are for new components. Consequently, each component acquisition receives an initial screening regarding its SSC grade and safety application. Procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*, requires an initial (Part 1 Technical Evaluation) input or screening by the Nuclear Procurement Engineering Department Manager or designee and the design authority representative, and the design engineer for each component acquisition. Although not specifically called out as a USQ, the Part 1 Technical Evaluation documents the SSC grade/quality level, SSC application, design function(s), safety function(s)/functional requirement(s), design requirement(s), design bases, component parts and/or material required for the SSC to perform the safety function(s), and failure evaluation; develops a list of critical characteristics, and associated acceptance criteria; lists applicable regulatory codes and standards; lists applicable handling, shipping, and storage (including maintenance) requirements; and lists additional technical evaluation contributors/reviewers.

Currently, the project has not established CSEs for each of the new facilities systems, so the CSEs are not involved with the USQ determination (USQD)-like process. The procurement engineers and design engineers interact with operations engineers in the existing Y-12 facility where analogous systems are already in operation. The review team interviewed a variety of contractor engineering staff regarding the process and specifically inquired about system ownership and eventual responsibility for system configuration control. Based on those interviews, it appears that the process assumes a collaborative handoff of ownership from the design engineers to the procurement engineers to the field engineers responsible for installation and initial testing, to an eventual assignment of an operational CSE.

The initial Q level screenings and, where applicable, USQ screening/determinations for changes are performed by qualified staff, who are knowledgeable of the safety basis. Per Y17-009, *Establishing and Maintaining the Technical Basis*, the project engineer is responsible for establishing and maintaining the Technical Basis Index Summary, which feeds the system requirements documents that are derived from the safety basis documents and used by the procurement engineers. Per Y74-802 *Safety Basis Documents for Nuclear and PSM\_RMP Facilities*, the project engineer is also required to approve the original and any changes to the PSDR or safety basis supplement documents. Per Y15-005, *Technical Change Process for Projects*, the project engineer makes the initial determination to invoke a USQD process when design changes are being considered. As such the USQD screening is to be performed by an individual who is expected to be knowledgeable of the safety basis.

The dedication procedures require verification either by supplier certification and/or facility receipt inspection and testing to assure that the procured items have the same form, fit, and function, critical characteristics, and failure modes as the design requires for the intended safety-related application. Procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant*

*Procurements*, requires development of the technical evaluation and acceptance criteria based on the characteristics of the requirements of safety class or safety significant procurements. The Technical Evaluation and Acceptance Plan includes a list of critical characteristics that, once verified, provide reasonable assurance that the SSC can perform the intended safety function(s). The technical evaluation documents the design bases and design requirement(s) as they pertain to safety-related SSC. (The design requirements are established in parallel within the engineering procurement documents.) The technical evaluation also applies to services on impacted safety related SSC to ensure that the SSC can perform the intended safety function(s) following performance of the services.

Procedures for preparing procurement specifications incorporate requirements for supplier certification of all critical characteristics of the procured items that are required by design and that the facility cannot or does not plan to further validate. Procedure Y17-95-69-310, *B&W Y-12 UPF Equipment Specifications*, requires the design engineer to “Prepare Seller’s data submittal requirements using forms UCN-23055, *UPF Engineering Document Submittal Requirements*, and UCN-23056, *UPF Quality Verification Document Submittal Requirements*.” Instructions for preparing these forms are provided in Y17-95-69-809, *UPF Seller Engineering and Quality Verification Documents for the UPF Project*. Procedure Y17-95-69-809 includes an example submittal list and instructions. At a minimum, form UCN.23056 includes the following Seller’s Conformance Statement: “We certify that the work and required documents meet the requirements of the procuring documents.” This conformance block must be signed by the supplier’s representatives.

Additionally, procedure Y17-95-69-309 requires the design engineer to specify the inspections and tests to be performed, the acceptance criteria, and who is responsible for conducting the inspections and tests, as well as where and when the inspections and tests are to be conducted. Depending on how those requirements are incorporated into the solicitation package, the design engineer may require the supplier to perform and document those inspections or tests.

Receipt inspections, dedication testing, installation instructions, and post-modification testing instructions and acceptance criteria must be appropriately specified in accordance with procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*.

Although the CGD program is written into established and approved procedures, the process for CGD of components and qualification of components important to safety has not yet been demonstrated through an approved acquisition.

Inevitably, throughout the design, acquisition, construction, and installation phases of the project, there will be some changes to systems or the items being procured. Procedures have been developed for reviewing these changes to ensure that system requirements and performance criteria are not affected in a manner that adversely impacts the system’s ability to perform its intended safety function. Procedure Y-15-005, *Technical Change Process*, states: “Ensure that the proposed change is evaluated using the Preliminary Documented Safety Analysis Change Control Checklist (UCN-21736).” Per this procedure, “the project engineer, team members, and SMEs [subject matter experts] must consider the potential impact that changes may have on safety and technical basis documents (e.g., process descriptions, system design description, design and analysis calculations, and hazard evaluation).” Given the status of the project, it was not possible to review complete examples of this process or checklists for procurements of safety related SSC.

Procedures address the requirements for subjecting documents that are affected by the changes and are appropriately identified for revision to formal change control and work control processes. The primary responsibility for assuring that this process is followed is assigned to the project engineer. A Document Change Notice (DCN) process is implemented via Procedure Y15-101, chapter 4. Per procedure Y-15-

005, *Technical Change Control Process for Projects*, the project engineer is required to sign and date the Project Change Request (PCR) when the affected documents have been revised or DCNs have been issued.

The effective implementation of the process to qualify components relies on appropriate training and qualification of the individuals who evaluate the components against the specifications and safety requirements. The procedures provide the basis for establishing the requirements for inspection, testing, and dedication of safety related procurements. The QA requirements outlined in Y17-95-69-310, *B&W Y-12 UPF Equipment Specifications*, specify who is responsible for performing and witnessing the inspections and tests but do not directly address the specific credentials, qualifications, or training requirements for the personnel performing or witnessing the inspections or tests. The responsibility for specifying those credentials lies with the procurement engineer in consultation with the design engineer who prepares the TEAP and the supporting QA organization on a case-by-case basis, depending on the nature of the procurement.

While efforts will be made to assure that services and components are acquired from previously evaluated and approved suppliers, as noted above in Section III (identifying qualified vendors), there may be circumstances where use of an unapproved supplier is necessary. The facility has a well defined procedure and assignment of responsibilities for procuring services from an unapproved supplier for use in safety-related applications.

Procedure Y15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*, outlines three methods for acceptance of commercial grade SSC or services: (1) Special Inspections or Tests; (2) Survey of the Supplier; and (3) Source Verification. The procedure defines how the evaluation plan is to be implemented and who is to perform the evaluations. Procedure Y17-95-69-809, *UPF Seller Engineering and Quality Verification Documents for the UPF Project*, provides the process for assessing seller quality verification documentation. These procedures place the responsibility on the project engineer and design engineer to establish appropriate review criteria and review teams.

To date, there have been no acquisitions, so the review team could not determine the effectiveness of implementation of the written procedures. The review team also could not review records of USQ screens or verification records for services provided by unapproved suppliers to demonstrate the acceptability of this process for safety related applications.

## **V. Performing Source and Receipt Inspections To Verify Quality**

The inspection criteria for this section of the CRAD are as follows:

- Processes and procedures have been established and are implemented to qualify source inspectors, establish appropriate manufacturing hold points, conduct source inspections, document inspection results, and track resolution of identified non-conformances. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 2, 3, 7, and 8; NQA-1-2000, Requirements 5, 7, 9, 10, and 11.
- Processes and procedures have been established and are implemented to qualify receipt inspectors, conduct receipt inspections, identify and control S/CI, segregate and disposition non-conforming items to prevent inadvertent use and installation, and appropriately label and store procured items to ensure traceability and maintenance of qualifications. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 2, 3, 5, 7, and 8; NQA-1-2000, Requirements 5, 7, 8, 9, 10, 11, and 15.
- Processes and procedures have been established and are implemented to conduct necessary post-maintenance/modification testing to verify functional and critical characteristics for dedication of

components for safety-related application that cannot otherwise be demonstrated. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 3, 7, and 8; NQA-1-2000, Requirements 5, 7, 9, 10, and 11.

- Processes and procedures have been established and are implemented to ensure that measurement and test equipment used during source and receipt inspection is calibrated and maintained. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 5 and 8; NQA-1-2000, Requirements 5, 10, 11, and 12.

To date, the project has not been authorized to procure safety related items, so although the written program incorporates a Technical Evaluation and Acceptance Plan (TEAP), the process has not yet been exercised for the UPF. In addition, the QA teams have not yet been established and fully trained to implement the acceptance plans and receipt inspections.

In accordance with the procedures, inspections and tests shall be performed to verify that the physical and functional aspects of materials and components meet requirements and are fit for use and acceptance during source and receipt inspections. Per procedure Y-15-910, *Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements*, the TEAP developed by the procurement engineer and design engineer may specify a combination of methods for assuring component quality. These include:

1. Receipt inspection
2. Post-installation testing performed by B&W Y-12
3. Certificate of conformance provided by the supplier attesting that the quality controls were implemented effectively to assure that specific critical characteristics were satisfied
4. In-process verification, including hold and witness points at the supplier's facility during the manufacturing process.

Since the QA organization has not yet been implemented, the review team could not assess the adequacy of the resources for performing these surveillances and inspections.

The TEAP developed by the procurement engineer, in consultation with the design engineer and the QA organization, may include inspections, testing, and witness hold points during manufacturing processes to assure conformance of critical characteristics of the components.

A Required Seller Documentation plan and review criteria are included in the solicitation package developed by the procurement engineer and reviewed by the source selection and QA organizations. These may be used to specify the tests and acceptance criteria to be certified by the supplier. Although it could not be demonstrated with completed procurements examples, this required documentation is intended to include QA test results confirming that safety/operability requirements are satisfied.

In accordance with procedure Y-17-95-64-846, *Material Receiving*, safety related parts are to be inspected to ensure that the vendor has supplied what was ordered and has included appropriate documentation (e.g., Certificate of Conformance, certified material test record), and that the parts are received in acceptable condition, as defined in the approved requisition. Based on the Q level requirements established by the procurement engineer working with the project engineer, a graded level of certification from the supplier, and specified in the TEAP criteria, B&W Y-12 will perform an inspection upon receipt. The process is to be managed by the field engineers for Quality Level (QL)-3/4 items and by the quality control (QC) engineers for Q-1, QL-2, and some QL-3 items. Given the current status of the project, it was not possible to review demonstrated application of these procedures.

Forms UNC-23055 and UCN-23056 outline the required document submittals and document the supplier's certification of conformance (COC) and the contractor's receipt acceptance. The forms require

a signature by the supplier's QA representative specifying that the requirements are met or indicating a deviation. The forms also require a listing of the documents required by the procurement package to evidence supplier QA review.

The document submittal plans include a requirement for the suppliers to provide instructions for post-receipt maintenance and testing of the equipment. Since this aspect of the process has not yet been implemented, the review team could not verify the adequacy of the procedures.

If a non-conformance is identified during the process of qualifying an item or component through the acceptance plan or later post-installation testing, procedure Y-17-94-64-804, *Uranium Processing Facility Construction Nonconformance Reporting and Control*, provides the necessary instructions and work process for disposition. The procedure specifies the requirements for documentation of the non-conformance, initial segregation and tagging of the item, and the necessary reviews and approvals. It also allows for various determinations, including use-as-is, repair, or replace. The QC organization is responsible for identifying trends in non-conformances; reporting those through Y15-331, *Lessons Learned Program*; and assuring that the UPF project manager, QA manager, and QC manager are informed of those trends.

## **VI. Storing the Items in a Manner That Preserves Their Integrity**

The inspection criterion for this section of the CRAD is as follows:

- Processes and procedures have been established and implemented for appropriate storage and maintenance of procured safety-related items to ensure that they are retrievable, are traceable to their QA records, and continue to be qualified for use for their intended application. Reference 10 CFR 830.122 and DOE Order 414.1D, Criterion 5; NQA-1-2000, Requirements 5, 8, and 13; NQA-1-2000, Part II, Subpart 2.2.

Given the current project status, the infrastructure for material control, traceability, and storage has not yet been established. Although planning is under way, the receiving, storage, and staging areas have not yet been prepared. Portions of the QA organization are in place to support the existing Y-12 facilities, but most of the personnel who will perform the QA receipt inspections and maintain the warehousing and storage areas for the UPF project have not yet been hired and trained. While the review team was able to examine the written procedures, it was not possible to observe the implementation of this portion of the acquisition process or review documentary evidence of its adequacy as implemented.

The basic procedures Y17-95-64-816, *UPF Field Material Storage Control*, and Y17-95-64-847, *UPF Field Material Control and Traceability*, govern field material storage, control, and traceability. These procedures lay out roles and responsibilities for the QC engineers, the project field engineers, the field engineers, and superintendents with respect to control and storage of materials. These procedures present controls, traceability requirements, and environmental storage conditions based the quality level (QL -1 through QL-4) as determined by the procurement engineers. While these procedures do not specifically identify items based on safety significance, the specification of safety requirements and material certification is incorporated into the initial determination of the quality level during the acquisition process. The higher levels (QL-1 and QL-2) require maintenance of traceability documentation and periodic inspection and testing of materials.

Procedure Y17-95-64-816 commits the project to base storage environmental controls in accordance with NQA-1 storage levels A, B, C, and D. The instructions for storage and periodic inspection are determined by the field engineer based on project equipment lists, design drawings, and vendor manuals.

Per Y17-95-64-816, the storage and maintenance program developed by the field engineer is expected to incorporate shelf life considerations incorporated in the Material Receiving Report. An electronic database system (EQMS) is required to include storage, maintenance, and shelf life requirements and limitations.

Per Y17-95-64-816 (5.3.4), where required due to shelf life limitations or pre-installation instructions provided by the supplier, an equipment maintenance schedule shall be established on the Stored Equipment Maintenance Log (CFN-1034) by the field engineer utilizing the latest EQMS reports and implemented by the superintendent.

## **VII. Tracking and Tracing the Items Through Their Lifecycle**

The inspection criterion for this section of the CRAD is as follows:

- QA records are controlled and maintained to provide documentation for qualified parts and materials and to ensure traceability of parts and materials. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 4 and 5; NQA-1-2000, Requirements 5, 6, 8, 14, and 17.

Given the current status of the project, no safety related components or materials have been acquired and no release for construction has been permitted, so the review team could not assess the implementation of the lifecycle tracking processes. General procedures for controlling the issuance of material and components for the construction and installation phases of the project have been issued and were reviewed against these lines of inquiry.

The written procurement processes provide a basis for material procurement status, including stock records, tracking of purchase orders, and maintaining traceability of safety related parts and material.

Roles and responsibilities of the project field procurement engineers, the project field engineers, the field engineers, the QC engineers, and the superintendents are detailed in procedure Y17-95-64-816, *UPF Field Material Storage Control*. The procedures outline process flows that are to be implemented using forms for the Materials Receiving Report to initiate the inventory records. Procedures are in place using the Material Withdraw Request form to track materials as they are taken out of storage and the Material Traceability Transfer Record to assure appropriate tracking of identification and lot information. The BAPS system is intended to track inventories and materials utilization through the lifecycle. An electronic database system is to be used to assist tracking storage and maintenance requirements. The efficacy of these processes could not be demonstrated because the project is not yet in that stage of procurement implementation.

Procedure Y17-95-64-847, *UPF Field Material Control and Traceability*, details the process flow and documentation control intended to control transfer of materials to field personnel for use or installation. The process begins with the field engineer generating a Material Withdraw Request that specifies the material, the task or work package, and the individuals who should receive the material. The process requires a variety of verification or witness signatures as the material is withdrawn from stocks. Once material is withdrawn from stock, the field engineers are responsible for assuring that it is controlled, stored, and used in a manner that maintains its functionality and conforms to the design requirements. The procedure includes Material Traceability Transfer Record sheets that require work package and task information, as well as material specifications, grades, and heat or trace code or batch number information. When implemented, this process should ensure that parts, materials, and equipment are controlled – i.e., items are used in the correct application, and the required QA traceability is maintained after issuance from storage.

## **VIII. Preventing the Use of Suspect/Counterfeit Items**

The inspection criterion for this section of the CRAD is as follows:

- Procedures and training requirements have been established and implemented for identification, segregation, reporting, and disposition of S/CI to prevent their use during construction, operations, maintenance, and modifications. Reference DOE Order 414.1D, Attachment 2, Section 4; 10 CFR 830.122 and DOE Order 414.1D, Criteria 2, 3, 5, 7, and 8; NQA-1-2000, Requirements 2, 5, 8, 10, and 15.

Procedure Y17-95-64-804, *UPF Construction Nonconformance Reporting and Control*, establishes the roles and responsibilities and work processes for personnel to identify, report, and disposition items services and conditions for SSC that do not conform to the design requirements. As a subset of these non-conformances, S/CI are further controlled and reported based on procedure Y60-138, *Suspect and Counterfeit Item Control Program Operations*.

The project has not yet fully established and implemented the receipt inspection organization to support the UPF since procurements have not yet been authorized. Inferences about the anticipated training of receipt inspection and QA personnel can be drawn for the established practices for the existing Y-12 facilities. In the summer of 2011, training sessions were conducted for Y-12 staff on the identification, reporting, and disposition of S/CI.

In accordance with procedure Y17-95-64-804, *UPF Construction Nonconformance Reporting and Control*, non-conforming items are to be segregated. If segregation is not feasible due to the size of the component or other limiting conditions, the items are to be tagged to remove them from use.

Procedures have been established for the review and disposition of all non-conforming items. Given the status of the project, the review team could not assess implementation of the procedures.

The established procedures require reporting of S/CI through the Occurrence Reporting and Processing System, which is available for review by appropriate Y-12 Site Office and project personnel. In addition, the B&W parent company has established a lessons-learned process.

## **IX. Applying System Engineer Oversight To Ensure Safety System Operability and Reliability**

The inspection criteria for this section of the CRAD are as follows:

- CSEs are appropriately involved and integrated into the procurement processes for items and services intended for safety-related applications to ensure configuration management and that changes to assigned system design requirements, physical configuration, or documentation (including analysis, drawings, and procedures) are controlled and effectively implemented in accordance with established configuration management program requirements. Reference 10 CFR 12 830.122 and DOE Order 414.1D, Criteria 4 and 6; 10 CFR 830.201, 202, and 203; NQA-1- 2000, Requirements 4, 5, and 6.
- CSE qualification and training requirements must include knowledge of the system safety basis and requirements, configuration management, USQ screening/determinations, system design, procurement, maintenance, modification, testing, and related QA requirements. Reference 10 CFR 830.122 and DOE Order 414.1D, Criterion 2; 10 CFR 830.201, 202, and 203; NQA-1- 2000, Requirement 2.

The project has not yet established CSEs for each of the new facility's systems. The procurement engineers and design engineers interact with operations engineers in the existing facility where analogous systems are already in operation. The review team interviewed a variety of contractor engineering staff regarding the process and specifically inquired about system ownership. Based on those interviews, it appears that the process assumes a collaborative handoff of ownership from the design engineers to the procurement engineers to the field engineers responsible for installation and initial testing, to an eventual assignment of an operational CSE. The project engineer currently has overall responsibility for coordinating the processes and assuring consistency throughout all the phases of the project.

## **X. Performing Assessments To Ensure That the Procurement Program Is Functioning as Intended**

The inspection criterion for this section of the CRAD is as follows:

- Procedures and plans have been established to assess the performance of the procurement program, identify needed improvements, and track and assess the effectiveness of corrective actions. Reference 10 CFR 830.122 and DOE Order 414.1D, Criteria 3, 9, and 10; NQA-1-2000, Requirements 5 and 18.

Procedures have been developed that generically address the audit and assessment processes. To date, the procurement process has not been fully implemented, so no internal audits or management assessments of the procurement process have been conducted for the UPF project.

Procedure Y60-95-801, *Conduct of Uranium Processing Facility Project Internal Quality Assurance Audits*, addresses the general roles and responsibilities and strategies for implementing PL-PJ-801768-A004, *Quality Assurance Plan for the Uranium Processing Facility*.

Procedure Y15-902, *Management Assessment*, provides guidance on establishing and maintaining an annual schedule for performance of reviews to support the project's contractor assurance system. It provides guidance on performing the assessments, analyzing the results, and providing feedback to improve performance.

Procedure Y15-312, *Issues Management Process*, provides guidance on identifying and significance-grading issues, developing and implementing corrective action plans, assessing the effectiveness of corrective actions and issues closure, providing lessons-learned feedback, and trending.

As a group, these procedures generally provide the project with the tools needed to perform procurement system audits and assessments. It is not yet possible to assess the effectiveness of this aspect of the procurement processes.

### **Documents Reviewed Section I:**

- DG-EG-801768-A002, UPF Specification Writer's Design Guide
- ML-QA-801768-A002, Requirements Crosswalk for UPF QAP
- PL-PJ-801768-A004, Quality Assurance Plan for the Uranium Processing Facility
- PL-TR-801768-A001, Training Plan for the Uranium Processing Facility (UPF) Project Procurements
- Standing Order - SO-Y-12-11-032, Identifying Suspect and Counterfeit Item Controls in Y18-012
- TBTP-TR-801768, UPF Baseline Training Program (BTP) Analysis and Approval Checklist
- UCN -23013, UPF Training Impact Assessment (multiple examples)
- UCN-20631, Training Impact Assessment (multiple examples)
- Y-12 UPF Organization Chart



- Y15-101, Records and Controlled Documents
- Y15-910, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements
- Y15-95-910, Commercial Grade Dedication Packages for the UPF Project
- Y17-69-325, Design Verifications
- Y17-69-424, Functional Acceptance Criteria
- Y17-95-69-307, UPF Design Analyses and Calculations
- Y17-95-69-309, B&W Y-12 UPF Equipment Data Sheets
- Y17-95-69-310, B&W Y-12 UPF Equipment Specifications
- Y17-95-69-809, UPF Seller Engineering and Quality Verification Documents for the UPF Project
- Y17-95-821, UPF Material Requisition
- Y30-802, Basic Procurement Instructions
- Y30-803, Procurement Specification Manual
- Y60-101-PD, B&W Y-12 Quality Program Description
- Y60-200, Graded Approach to Quality
- Y60-701, B&W Y-12 Procurement Quality Manual
- Y60-95-811, UPF Supplier Quality Manual

**Documents Reviewed Section II:**

- DG-EG-801768-A002, UPF Specification Writer's Design Guide
- Y15-005, Technical Change Control Process for Projects
- Y15-101, Records and Controlled Documents
- Y15-910, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements
- Y17-009, Establishing and Maintaining the Technical Basis
- Y17-69-325, Design Verifications
- Y17-69-424, Functional Acceptance Criteria
- Y17-95-69-307, UPF Design Analyses and Calculations
- Y17-95-69-309, B&W Y-12 UPF Equipment Data Sheets
- Y17-95-69-310, B&W Y-12 UPF Equipment Specifications
- Y17-95-69-809, UPF Seller Engineering and Quality Verification Documents for the UPF Project
- Y17-95-821, UPF Material Requisition
- Y30-802, Basic Procurement Instructions
- Y30-803, Procurement Specification Manual
- Y60-101-PD, B&W Y-12 Quality Program Description
- Y60-200, Graded Approach to Quality
- Y70-68-001, Criticality Safety Approval/Requirements Development, Review, and Approval
- Y74-802, Safety Basis Documents for Nuclear and PSM/RMP Facilities
- Y74-48-007, Hazard Identification and Screening to Support Development of a Hazard Evaluation Study
- Y74-48-008, Hazard Evaluation Study
- Y74-48-009, Accident Analysis
- Y74-48-017, Safety Analysis Supporting Design
- PL-TR-801768-A001, Training Plan for the Uranium Processing Facility (UPF) Project Procurements
- TBTP-TR-801768, UPF Baseline Training Program (BTP) Analysis and Approval Checklist
- UCN -23013, UPF Training Impact Assessment
- UCN-20631, Training Impact Assessment

**Documents Reviewed Section III:**

- PL-PJ-801768-A004, Quality Assurance Plan for the Uranium Processing Facility
- PROD-Y17 -95-69-809, Deviation to Procedure Y17-95-69-809, *Seller Engineering and Quality Verification Documents for the UPF Project*

- UCN-22295, Commercial Grade Survey Checklist
- UCN-22296, Supplier Capability Survey
- Y15-910, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements
- Y15-95-910, Commercial Grade Dedication Packages for the UPF Project
- Y17-69-420, Commercial Grade Survey of Supplier
- Y17-69-424, Functional Acceptance Criteria
- Y17-95-69-310, B&W Y-12 UPF Equipment Specifications
- Y17-95-69-809, UPF Seller Engineering and Quality Verification Documents for the UPF Project
- Y30-802, Basic Procurement Instructions
- Y30-803, Procurement Specification Manual
- Y60-101-PD, B&W Y-12 Quality Program Description
- Y60-701, B&W Y-12 Procurement Quality Manual
- Y60-95-811, UPF Supplier Quality Manual

**Documents Reviewed Section IV:**

- Y15-95-910, Commercial Grade Dedication Packages for the UPF Project
- Y15-910, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements
- Y15-005 Technical Change Control Process for Projects
- Y17-95-69-310, B&W Y-12 UPF Equipment Specifications
- Y17-95-69-309, UPF Equipment Data Sheets
- Y17-95-69-809, UPF Seller Engineering and Quality Verification Documents for the UPF Project
- Y17-009, Establishing and Maintaining the Technical Basis
- Y70-68-001, Criticality Safety Approval Requirements Development Review and Approval
- Y74-802, Safety Basis Documents for Nuclear and PSM\_RMP Facilities
- Y74-48-007, Hazard Identification and Screening to Support Development of Hazard Evaluation Study
- Y74-48-008, Hazard Evaluation Study
- Y74-48-009, Accident Analysis
- Y74-48-017, Conceptual Safety Design Reports and Preliminary Safety Design Reports

**Documents Reviewed Section V:**

- Y15-005, Technical Change Control Process for Projects
- Y15-910, Technical Evaluation and Acceptance of Safety Class or Safety Significant Procurements
- Y15-95-910, Commercial Grade Dedication
- Y17-95-69-309, UPF Equipment Data Sheets
- Y17-95-69-310, UPF Equipment Specifications
- Y17-009, Establishing and Maintaining the Technical Basis
- Y70-68-001, Criticality Safety Approval Requirements Development Review and Approval
- Y74-802, Safety Basis Documents for Nuclear and PSM\_RMP Facilities
- Y74-48-007, Hazard Identification and Screening to Support Development of Hazard Evaluation Study
- Y74-48-008, Hazard Evaluation Study Y74-48-009
- Y74-48-017, Conceptual Safety Design Reports and Preliminary Safety Design Reports
- Y-17-94-64-804, Uranium Processing Facility Construction Nonconformance Reporting and Control

**Documents Reviewed Section VI:**

- Y17-95-64-816, *UPF Field Material Storage Control*
- Y17-95-64-847, *UPF Field Material Control and Traceability*

**Documents Reviewed Section VII:**

- Y17-95-64-816, UPF Field Material Storage Control

- Y17-95-64-845, UPF Field Material Withdrawal
- Y17-95-64-846, UPF Material Receiving
- Y17-95-64-847, UPF Field Material Control and Traceability

**Documents Reviewed Section VIII:**

- Y60-138, *Suspect and Counterfeit Item Control Program Operations.*
- Y17-95-64-804, *UPF Construction Nonconformance Reporting and Control*
- Y17-95-64-846, UPF Material Receiving

**Documents Reviewed Section IX:**

None Applicable

**Documents Reviewed Section X:**

- Procedure Y60-95-801, *Conduct of Uranium Processing Facility Project Internal Quality Assurance Audits*
- Procedure Y15-902, *Management Assessment*
- Procedure Y15-312, *Issues Management Process*
- PL-PJ-801768-A004, *Quality Assurance Plan for the Uranium Processing Facility*