

August 13, 2014

Curtis A. Castell, P.E.
Licensing Manager
Nuclear Division
Shaw's Power Group
128 S. Tryon St., Suite 400
Charlotte, NC 28202

SUBJECT: U.S. NUCLEAR REGULATORY COMMISSION APPROVAL LETTER FOR
TOPICAL REPORT CMS-720-03-PL-00020, REVISION 0, "QUALITY
ASSURANCE PROGRAM DESCRIPTION" (TAC NO. MF1798)

Dear Mr. Castell:

By letter dated May 13, 2013 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML13137A098), Chicago Bridge and Iron (CB&I) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Topical Report (TR), CMS-720-03-PI-00020, Revision 0, "Quality Assurance Program Description." By letter dated January 27, 2014 (ADAMS Accession No. ML14002A025), the NRC staff transmitted a request for additional information and CB&I provided responses in a letter dated April 15, 2014 (ADAMS Accession No. ML14108A084).

The CB&I TR addresses the activities associated with engineering, design, procurement, construction, modification, repair, and decommissioning of nuclear facilities. The TR is based on the applicable portions of both Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and the American Society of Mechanical Engineers NQA 1-2008, "Quality Assurance Program Requirements for Nuclear Facilities," with 1a-2009 Addenda, as endorsed by NRC Regulatory Guide 1.28, Revision 4, "Quality Assurance Program Criteria (Design and Construction)."

The NRC staff has reviewed CB&I's TR and supporting documentation. Based on its review, the NRC staff finds that the quality assurance program described in the CB&I TR, as revised by the referenced supplemental letter, meets the criteria of Appendix B to 10 CFR Part 50 and is, therefore, acceptable. The associated safety evaluation (SE) is enclosed.

In accordance with the guidance provided on the NRC website, we request that CB&I publish an accepted version of the TR within three months of receipt of this letter. The accepted version shall incorporate this letter and the enclosed final SEs after the title page. Also, the accepted version must contain historical review information, including NRC requests for additional information (RAI) and your responses after the title page. The accepted version shall include a "-A" (designating accepted) following the TR identification symbol.

As an alternative to including the RAIs and RAI responses behind the title page, if changes to the TRs were provided to the NRC staff to support the resolution of RAI responses, and the NRC staff reviewed and approved those changes as described in the RAI responses, there are two ways that the accepted version can capture the RAIs:

1. The RAIs and RAI responses can be included as an Appendix to the accepted version.
2. The RAIs and RAI responses can be captured in the form of a table (inserted after the final SE) which summarizes the changes as shown in the approved version of the TR. The table should reference the specific RAIs and RAI responses which resulted in any changes, as shown in the accepted version of the TR.

If future changes to the NRC's regulatory requirements affect the acceptability of this TR, CB&I and/or licensees referencing it will be expected to revise the TR appropriately, or justify its continued applicability for subsequent referencing.

If you have any questions or need additional information, please feel free to contact the NRC project manager for the TR, Joe Holonich. Mr. Holonich can be reached at 301-415-7297.

Sincerely,

/RA/

Aby S. Mohseni, Deputy Director
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Enclosure:
As stated

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SAFETY EVALUATION BY THE OFFICE OF NEW REACTORS

REGARDING THE CB&I TOPICAL REPORT

CMS-720-03-PL-00020, REVISION 0, "QUALITY ASSURANCE PROGRAM DESCRIPTION"

1.0 INTRODUCTION

By letter dated May 14, 2013, Chicago Bridge and Iron (CB&I), submitted for U.S. Nuclear Regulatory Commission (NRC) staff review Topical Report CMS-720-03-PL-00020, Revision 0, "Quality Assurance Program Description" (hereafter referred to as the QAPD) for NRC review and acceptance, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.4(b)(7)(ii). CB&I provided additional information by letter dated April 15, 2014 in response to an NRC request for additional information dated January 27, 2014. CB&I, by letter dated June 3, 2014, provided additional clarifying information and an updated version of the QAPD.

2.0 REGULATORY EVALUATION

The Commission's regulatory requirements related to quality assurance (QA) programs for non-licensees are set forth in 10 CFR 50.4(b)(7)(ii). This regulation requires that a change to an NRC-accepted QAPD from non-licensees (i.e., architect/engineers, nuclear steam system suppliers (NSSS), fuel suppliers, constructors, etc.) must be submitted to the NRC. The NRC will review the proposed QAPD for acceptability to ensure the applicable requirements of Appendix B to 10 CFR Part 50 will be satisfied.

Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to 10 CFR Part 50 establishes QA requirements for the design, fabrication, construction, testing, and operation of structures, systems, and components (SSCs) for the facility. The pertinent requirements of Appendix B apply to all activities affecting the safety-related functions of those SSCs and include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying SSCs.

3.0 EVALUATION

The proposed QAPD is similar in many respects to previous submittals approved for licensees for the purpose of meeting NUREG-0800, "Standard Review Plan" (SRP), Section 17.5, "Quality Assurance Program Description – Design Certification, Early Site Permit and New License Applicants" (hereafter referred to as Section 17.5).

In evaluating the adequacy of the QAPD, the NRC staff utilized the guidance contained in Section 17.5, which provides acceptance criteria for design certification, early site permit, combined operating license, construction permit, and operating license applicants. Section 17.5 is based on the American Society of Mechanical Engineers (ASME) Standard NQA-1-1994 Edition, as supplemented by additional regulatory and industry guidance for nuclear operating facilities. ASME Standard NQA-1-2008 Edition and NQA-1a-2009 Addenda, upon which the CB&I QAPD is based, incorporates the supplemental guidance into a single document, and is therefore in alignment with Section 17.5. In addition, NQA-1-2008 Edition and NQA-1a-2009

Enclosure

Addenda (hereafter referred to as NQA-1-2008) is endorsed by NRC Regulatory Guide (RG) 1.28, Revision 4.

3.1 Quality Assurance Program Overview

Topical Report CMS-720-03-PL-00020, Revision 0, and supporting documentation provides CB&I's QAPD for engineering, design, procurement, construction, modification, repair, and decommissioning of nuclear facilities. The topical report is divided into four parts: I) Introduction; II) Quality Assurance Program Description (18 Criteria); III) Nonsafety-Related SSC Quality Control; and IV) Regulatory Commitments.

3.1.1 Organization

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.A, for providing an organizational description that includes the organizational structure, functional responsibilities, levels of authority, and interfaces for establishing, executing, and verifying CB&I QA program implementation. The CB&I QAPD establishes independence between the organization performing checking functions related to the QA program and the organization responsible for performing the function. In addition, the CB&I QAPD provides for applicable management to be responsible to size the QA organization commensurate with the duties and responsibilities assigned. Finally, responsibility and authority for planning, establishing, and implementing an effective overall QA program are clearly described and defined.

The CB&I QAPD commits to implement the quality standards described in NQA-1-2008, Requirement 1, without further clarifications or exceptions. The staff's review of the organizational controls finds that it is consistent with the quality requirements in NQA-1-2008 and Section 17.5, and is therefore acceptable.

3.1.2 Quality Assurance Program

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.B, for establishing the necessary measures to implement a QA program.

A list or system identifying the SSCs and activities to which the CB&I QA program applies is maintained for the design certification project. CB&I may delegate all or part of the activities for which they are responsible to others, but retains overall responsibility for the QA program's effectiveness.

The CB&I QAPD provides for measures to assess the adequacy of the QA program and to ensure its effective implementation, at least once each year or at least once during the life of the activity, whichever is shorter. In addition, consistent with Section 17.5, Paragraph II.B.8, the CB&I QA program applies a grace period of 90 days to activities that must be performed on a periodic basis. The grace period does not allow the "clock" for a particular activity to be reset forward. However, the "clock" for an activity is reset backwards by performing the activity early.

The CB&I QAPD follows the guidance of Section 17.5, Paragraphs II.S and II.T, for describing the necessary measures to establish and maintain formal indoctrination and training programs for personnel performing, verifying, or maintaining activities within the scope of the QA program

to assure that suitable proficiency is achieved and maintained. The CB&I QAPD provides the minimum training requirements for all personnel responsible for planning, implementing, and maintaining the CB&I QA program.

The CB&I QAPD commits to implement the quality requirements described in NQA-1-2008, Requirement 2, with the following clarifications and exceptions:

- Section 302, Inspection and Test
 - (1) In lieu of being certified as Level I, II, or III in accordance with NQA-1-2008, personnel that perform independent quality verification inspections, examinations, measurements, or tests of material, products, or activities will be required to possess qualifications equal to or better than those required for performing the task being verified; and the verification is within the skills of these personnel and/or is addressed by procedures. These individuals will not be responsible for the planning of quality verification inspections and tests (i.e. establishing hold points and acceptance criteria in procedures and determining who will be responsible for performing the inspections), evaluating inspections training programs, nor certifying inspection personnel.

The staff finds this alternative acceptable since it is consistent with Section 17.5, Paragraph II.T.5.

- (2) A qualified engineer may be used to plan inspections, evaluate the capabilities of an inspector or evaluate the training program for inspectors. For the purpose of these functions, a qualified engineer is one who has a baccalaureate in engineering in a discipline related to the inspection activity (such as electrical, mechanical, civil) and has a minimum of five (5) years engineering work experience with at least two (2) years of this experience related to nuclear facilities.

The staff's review of this alternative finds that there is no conflict with the quality standards in NQA-1-2008, Section 17.5, or other industry guidance in this subject area, and is therefore acceptable.

- Section 301, Nondestructive Examination (NDE)

CB&I follows Section 301 for qualification of NDE personnel, except that CB&I will follow the applicable standard cited in the versions(s) of Section III and Section XI of the ASME Boiler and Pressure Vessel (BPV) Code approved by the NRC for use at CB&I sites for the scope of activities governed by these cited standards.

The regulation in 10 CFR 50.55a, "Codes and standards," requires use of the latest edition and addenda of Section III and Section XI endorsed in 10 CFR 50.55a. Therefore, the staff finds the use of Sections III and XI of the ASME BPV Code for qualification of nondestructive examination personnel acceptable.

The staff's review of this alternative finds that there is no conflict with the quality standards described in NQA-1-2008, Section 17.5, or the ASME BPV Code requirements, and is therefore acceptable.

- Section 400, Records of Qualification

Section 400(a)(8) requires the date of certification expiration be included on the qualification record. CB&I considers the certification expiration date to be the date from the certification or recertification date plus the certification interval time and its inclusion on the qualification record is optional.

The date of certification establishes the expiration date, when combined with the certification level. The certification interval is normally a function of a code or standard and is identified in the organization's procedure; therefore because having both dates on the form is redundant, the staff determined that this exception is acceptable.

For projects which specifically commit to NQA-1-1994, by contract, CB&I commits to additional requirements in NQA-1-1994 related to Lead Auditors' Records (Supplement 2S-3, Section 6.3). The staff finds that supplementing NQA-1-2008 with specific details from NQA-1-1994 for contracts with licensee's that are committed to NQA-1-1994 is acceptable.

3.1.3 Design Control

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.C.1, for establishing the necessary measures to control the design, design verification, and analysis activities of safety-related items and services that are subject to the provisions of the QA program. The CB&I QA program design process includes provisions to control design inputs, outputs, changes, interfaces, records, and organizational interfaces. These provisions ensure that the design inputs (such as design bases, performance and regulatory requirements, and codes and standards) are correctly translated into design outputs (such as analyses, specifications, drawings, procedures, and instructions). In addition, the CB&I QAPD provides for design documents to be reviewed by individuals knowledgeable in QA to ensure that the documents contain the necessary QA requirements.

Consistent with Section 17.5, Paragraph II.C.2, the CB&I design processes provide for design verification to ensure that items and activities subject to the provisions of the QA program are suitable for their intended application and consistent with their effect on safety. Design changes are subject to these controls, which include verification measures commensurate with those applied to original plant design. The extent of the design verification required is a function of the importance to safety of the item under consideration, the complexity of the design, the degree of standardization, the state of the art, and the similarity with previously proven designs. Design verification activities are completed before the design outputs are used by other organizations for design work; before they are used to support other activities such as procurement, manufacture, or construction; or when such timing cannot be achieved, before relying on the item to perform its intended design or safety function. Verification methods may include, but are not limited to, design reviews, alternative calculations, and qualification testing.

The CB&I QAPD governs the development, procurement, testing, maintenance, and use of computer application and digital equipment software when used in safety-related applications and designated nonsafety-related applications. CB&I and its suppliers are responsible for developing, approving, and issuing procedures, as necessary, to control the use of such computer application and digital equipment software. The CB&I QAPD states that the procedures shall require that the application software be assigned a proper quality classification and that the associated quality requirements be consistent with this classification.

In establishing its program for design control and verification, CB&I commits to compliance with NQA-1-2008, Requirement 3, Subpart 2.7 for computer software, and Subpart 2.14 for commercial grade items and services without further clarifications or exceptions. The staff's review of the design controls finds it consistent with the quality standards in NQA-1-2008, and Section 17.5, and is therefore acceptable.

3.1.4 Procurement Document Control

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.D, for establishing the necessary administrative controls and processes to ensure that applicable regulatory, technical, and QA program requirements are included or referenced in procurement documents. Applicable technical, regulatory, administrative, quality, and reporting requirements (such as specifications, codes, standards, tests, inspections, special processes, and 10 CFR Part 21) are invoked for the procurement of items and services.

The CB&I QAPD commits to implement the quality standards described in NQA-1-2008, Requirement 4, with the following clarifications and exceptions:

- With regard to service performed by a supplier, CB&I procurement documents may allow the supplier to work under the CB&I QAPD, including implementing procedures, in lieu of the supplier having its own QAP.

Criterion IV of Appendix B requires suppliers to have a QA program consistent with Appendix B. The staff determined this clarification to be acceptable because it is consistent with Section 17.5, Paragraph II.D.2.d.

- Sections 300 and 400 of Requirement 4 require the review of technical and QA Program requirements of procurement documents prior to award of a contract and for procurement document changes. CB&I may satisfy this requirement through the review of the procurement specification, when the specification contains the technical and QA requirements of the procurement.

The staff evaluated this proposed alternative and determined that it provides adequate QA review of procurement documents before awarding the contract and after any change, which is consistent with Section 17.5, Paragraph II.D.3. Therefore, the staff concludes that this alternative is acceptable.

- Procurement documents for Commercial Grade Items that will be procured by CB&I for use as safety-related items shall contain technical and quality requirements such that the

procured item can be appropriately dedicated in accordance with the CB&I QAPD, Section 7, "Control of Purchased Material, Equipment and Services."

This alternative is consistent with staff guidance in Generic Letter (GL) 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marked Products," dated March 21, 1989, and GL 91-05, "Licensee Commercial-Grade Procurement and Dedication Programs," dated April 9, 1991, as delineated in Section 17.5, Paragraphs II.U.1.c and II.U.1.d. Therefore, the staff concludes this alternative is acceptable.

For projects which specify NQA-1-1994, by contract, CB&I commits to additional requirements in NQA-1-1994 related to Procurement Document Review (Supplement 4S-1, Section 3). The staff finds that meeting NQA-1-2008 with additional requirements from NQA-1-1994 for contracts with licensees that are committed to NQA-1-1994 is acceptable.

The staff's review finds that in establishing its program for procurement document control, CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 4 and the guidance in Section 17.5, with the above clarifications and exception, and is therefore acceptable.

3.1.5 Instructions, Procedures, and Drawings

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.E, for establishing the necessary measures and governing procedures to ensure that activities affecting quality are prescribed by, and performed in accordance with, documented instructions, procedures, or drawings of a type appropriate to the circumstances and which, where applicable, include quantitative or qualitative acceptance criteria to implement the QAPD.

The staff's review finds that in establishing its program for instructions, procedures, and drawings CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 5, and the guidance in Section 17.5, without further clarifications or exceptions, and is therefore acceptable.

3.1.6 Document Control

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.F, for establishing the necessary measures and governing procedures to control the preparation, review, approval, issuance of, and changes to documents that specify quality requirements or prescribe how activities affecting quality, including organizational interfaces, are controlled. Measures are provided to assure that documents, including revisions or changes (other than those defined in implementing procedures as minor changes), are reviewed and approved by the same organization that performed the original review and approval, unless other organizations are specifically designated. A list of all controlled documents, identifying the current approved revision or date, is maintained so personnel can determine the appropriate document for use.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 6, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable.

3.1.7 Control of Purchased Material, Equipment, and Services

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.G, for establishing the necessary measures and governing procedures to control the procurement of items and services to ensure conformance with specified requirements. The controls include measures for evaluating prospective suppliers and selecting only those that are qualified. In addition, controls include auditing and evaluating suppliers to ensure that qualified suppliers continue to provide acceptable products and services.

The program provides measures for source evaluation and selection, evaluation of objective evidence of quality furnished by the supplier, source inspection, audit, and examination of items or services. The CB&I QAPD establishes and implements measures to assess the quality of purchased items and services, whether purchased directly or through contractors, at intervals and to a depth consistent with the item's or service's importance to safety, complexity, quantity, and frequency of procurement.

The CB&I QAPD provides measures for evaluating prospective suppliers and selecting only qualified suppliers, as well as auditing and evaluating suppliers to ensure that qualified suppliers continue to provide acceptable products and services. The scope of procurement includes engineering, design and testing services, as well as the procurement of safety-related software.

The CB&I QAPD also outlines acceptance actions, such as source verification, receipt inspection, certificates of conformance, and review of documentation (e.g., Certified Material Test Reports/Certificates) to ensure that the procurement, inspection, and test requirements have been satisfied before relying on the item to perform its intended safety function.

In establishing procurement verification control, the CB&I QAPD commits the applicant to the quality standards described in NQA-1-2008, Requirement 7, with the following clarifications and exceptions:

- CB&I considers 10 CFR Parts 50 and 52 licensees, Authorized Nuclear Inspection (ANI) Agencies, National Institute of Standards and Technology (NIST), or other State and Federal agencies which may provide items or services to the CB&I nuclear projects are not required to be evaluated or audited.

The staff acknowledges that 10 CFR Part 50 and Part 52 licensees, ANI agencies, the NIST, and other State and Federal agencies perform work under acceptable quality programs. The staff determined that this exception is acceptable as documented in a previous SE (ADAMS Accession No. ML13023A051). CB&I is still responsible for ensuring that the items or services conform to its Appendix B program, applicable ASME BPV Code requirements, and other regulatory requirements and commitments. CB&I is also responsible for ensuring that the items or services are suitable for the intended application and for documenting this evaluation. The proposed exception is acceptable on the basis that it provides an appropriate level of quality and safety.

- *When purchasing commercial-grade calibration services from a calibration laboratory, procurement source evaluation and selection measures need not be performed provided each of the following conditions are met:*
 - a) The CB&I commercial grade dedication process shall be followed.
 - b) The performance of an evaluation to identify additional technical requirements and critical characteristics for the specific measuring and test equipment being calibrated.
 - c) The purchase documents impose any additional technical and administrative requirements, as necessary, to comply with the CB&I QA program and technical provisions. At a minimum, the purchase documents shall require that the calibration certificate/report include identification of the laboratory equipment/standard used.
 - d) The purchase documents require reporting as-found calibration data and as-left data when the calibrated items are found to be out-of-tolerance.
 - e) A documented review of the supplier's accreditation will be performed and will include a verification of the following:
 - The calibration laboratory holds a domestic (United States) accreditation by an NRC approved domestic (United States) accrediting bodies, recognized by the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement.
 - The accreditation encompasses ANS/ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories."
 - The published scope of accreditation for the calibration laboratory covers the necessary measurement parameters, range, and uncertainties.
 - f) The review of calibration records (e.g., as part of receipt inspection) to verify that the critical characteristics had been met.

The staff determined that the provisions of this exception are consistent with the regulatory guidance provided in Section 17.5, Paragraph II.L.8, for the procurement of commercial-grade calibration services for safety-related applications and as documented in a previous staff SE (ADAMS Accession No. ML052710224). The staff expects full conformance to the guidance in Section 17.5, Paragraph II.L.8, and Subparagraph h, that the alternative method is limited to the domestic calibration service suppliers.

- Holders of ASME Nuclear Certificates of Accreditation/Authorization shall be considered qualified as suppliers to perform or have performed, under their control, ASME III code work. The ASME certificate is considered sufficient evidence of an acceptable QA program and of the Supplier's capability to perform work within the scope of the Certificate. Post award QA implementation audits of the Certificate Holder are required.

The staff addressed this issue in Information Notice (IN) 86-21, "Recognition of American Society of Mechanical Engineers Accreditation Program for N Stamp Holders," dated March 31,

1986. IN 86-21 and its supplements document the staff's recognition of the ASME Accreditation Program and Certificate Program as providing evidence of an acceptable documented QA program that meets the requirements of 10 CFR Part 50, Appendix B. However, CB&I is still responsible for ensuring that the ASME supplier is effectively implementing the approved QA program. CB&I will perform post award QA implementation audits to verify effective implementation of the QA program. Therefore, the staff finds this alternative acceptable.

- For Section 501, CB&I considers documents that may be stored in approved electronic media under CB&I or vendor control, not physically located on the plant site, but accessible from the respective nuclear facility site as meeting the NQA-1-2008 requirement for documents to be available at the site. Following completion of the construction period, sufficient as-built documentation will be turned over from CB&I to the client. The CB&I records management systems will provide for timely retrieval of necessary records.

The staff determined that this alternative meets the requirements of Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services." Criterion VII requires documentary evidence that items conform to procurement documents to be available at the nuclear facility before installation or use. Therefore, this provision, which would allow for accessing and reviewing the necessary procurement documents at the site before installation and use, would meet this requirement, and is therefore acceptable.

- In establishing commercial-grade item and service requirements, CB&I commits to compliance with NQA-1-2008, Section 700 and Subpart 2.14, with the following clarification:
 - For commercial-grade items, quality verification requirements are established and described in CB&I documents to provide the necessary assurance an item will perform satisfactorily in service. The CB&I documents address determining the critical characteristics that ensure an item is suitable for its intended use, technical evaluation of the item, receipt requirements, and quality evaluation of the item.
 - CB&I will assume 10 CFR Part 21 reporting responsibility for all items and services that CB&I dedicates as safety-related.

The staff determined that the provisions of this clarification are consistent with the regulatory requirements of 10 CFR Part 21 and guidance provided in Section 17.5, Paragraphs II.U.1.d and II.U.1.e., and is therefore acceptable.

For projects which specify NQA-1-1994, by contract, CB&I commits to additional requirements in NQA-1-1994 related to Procurement Planning (Supplement 7S-1, Section 2), Bid Evaluation (Supplement 7S-1, Section 4), Supplier Performance Evaluation (Supplement 7S-1, Section 5), and Extent of Activities (Supplement 7S-1, Section 5.1). The staff finds that meeting the requirements of NQA-1-2008 with additional requirements from NQA-1-1994 for contracts with licensees that are committed to NQA-1-1994 is acceptable.

3.1.8 Identification and Control of Materials, Parts, and Components

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.H, for establishing necessary measures for identification and control of items such as materials, including consumables, and items with limited shelf life, parts, components, and partially fabricated subassemblies. Identification of items is maintained throughout fabrication, erection, installation, and use so that the item is traceable to its documentation.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 8, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable

3.1.9 Control of Special Processes

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.I, for establishing and implementing programs, procedures, and processes to ensure that special processes requiring interim process controls to ensure quality, such as welding, heat treating, chemical cleaning, and nondestructive examinations, are controlled in accordance with applicable codes, specifications, and standards for the specific application.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 9, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable

3.1.10 Inspection

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.J, for establishing necessary measures to implement inspections that ensure items, services, and activities affecting safety meet established requirements and conform to documented specifications, instructions, procedures, and design documents. The inspection program establishes requirements for planning inspections, determining applicable acceptance criteria, setting the frequency of inspection, and identifying special tools needed to perform the inspection. Qualified personnel perform the inspections and are independent of those who performed or directly supervised the work.

In establishing inspection requirements, CB&I commits to the quality standards described in NQA-1-2008, Requirement 10, and Subparts 2.4, 2.5, and 2.8 for establishing appropriate inspection requirements with the following clarifications and exceptions;

- Subpart 2.4 commits CB&I to ANSI/IEEE Std 336-1985 or later edition, which refers to IEEE Std 498-1985. Both IEEE Std 336-1985 and IEEE Std 498-1985 use the definition of "Safety Systems" from IEEE Std 603. CB&I commits to the definition of Safety Systems in IEEE Std 603-2009, but does not commit to the balance of that standard. This definition is only applicable to equipment in the context of Subpart 2.4.

The clarification is to reinforce the fact that the QAPD is not committing to the entirety of IEEE Std 603-2009. The staff determined that the use of the definition of safety systems equipment

in the context of Subpart 2.4 is acceptable because it is an accurate clarification of the definition.

For projects which specify NQA-1-1994, by contract, CB&I commits to additional requirements in NQA-1-1994 related to Combined Inspection and Monitoring (Supplement 10S-1, Section 6.2). The staff finds that meeting NQA-1-2008 with additional requirements from NQA-1-1994 for contracts with licensees that are committed to NQA-1-1994 is acceptable.

3.1.11 Test Control

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.K, for establishing necessary measures and governing provisions to demonstrate that items within the scope of the QAPD will perform satisfactorily in service. Testing is accomplished by qualified personnel in accordance with written controlled test procedures. CB&I's test control program includes, as appropriate, proof tests before installation, preoperational tests, post maintenance tests, and operational tests. Tests are performed according to applicable procedures.

CB&I QAPD establishes and implements provisions to assure that computer software used in applications affecting safety is prepared, documented, verified, and tested, and used such that the expected output is obtained and configuration control maintained. To this end, CB&I commits to compliance with the requirements of NQA-1-2008, Requirement 11, and Subpart 2.7 to establish the appropriate provisions in addition to the commitment to NQA-1-2008, Requirement 3.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 11, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable

3.1.12 Control of Measuring and Test Equipment

The CB&I QAPD follows the guidance of Section 17.5, paragraph II.L, for establishing necessary measures to control the calibration, maintenance, and use of M&TE that provides information important to safe plant operation. In establishing provisions for control of M&TE, CB&I commits to the quality standards described in NQA-1-2008, Requirement 12, with the following clarification and exception:

- NQA-1-2008, Subpart 2.4 refers to American National Standards Institute (ANSI)/IEEE Std 336-1985 for the installation, inspection, and testing requirements for power, instrumentation, and control equipment at nuclear facilities. Where ANSI/IEEE Std 336-1985 makes reference to the use of IEEE Std 498-1985 for measuring and test equipment control, CB&I will implement the QA requirements of NQA-1-2008, Requirement 12.

The staff finds that this alternative is consistent with the staff guidance provided in Section 17.5, Paragraph II.L.3., and is therefore acceptable.

For projects which specify NQA-1-1994, by contract, CB&I commits to additional requirements in NQA-1-1994 related to control of M&TE (Supplement 12S-1, Section 3.2). The staff finds that

meeting NQA-1-2008 with additional requirements from NQA-1-1994 for contracts with licensees that are committed to NQA-1-1994 is acceptable.

3.1.13 Handling, Storage, and Shipping

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.M, for establishing necessary measures to control the handling, storage, packaging, shipping, cleaning, and preservation of items to prevent inadvertent damage or loss and to minimize deterioration.

In establishing provisions for handling, storage, and shipping, the CB&I commits to the quality standards described in NQA-1-2008, Requirement 13. CB&I also commits to compliance with the requirements of NQA-1-2008, Subpart 2.1, Subpart 2.2, Subpart 2.3, Subpart 2.15, and Subpart 3.2, Appendix 2.1, with the following clarifications and exceptions:

NQA-1-2008, Subpart 2.2

- Subpart 2.2, Section 606, "Storage Records." This section requires written records be prepared containing information on personnel access. As an alternative to this requirement, CB&I documents establish controls for storage areas that describe those authorized to access areas and the requirements for recording access of personnel. However, these records of access are not considered quality records and will be retained in accordance with the administrative controls of the applicable project.

The staff determined that this proposed alternative is acceptable, on the basis that these records do not meet the classification of a quality record as defined in NQA-1-2008, Requirement 17.

NQA-1-2008, Part III, Subpart 3.2

- Subpart 3.2, Appendix 2.1: only Section 300, "Cleaning Recommendations and Precautions" are being committed to in accordance with RG 1.37 "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants," Revision 1. In addition, a suitable chloride stress-cracking inhibitor should be added to the fresh water used to flush systems containing austenitic stainless steels.

The staff determined that this proposed clarification is acceptable, on the basis that these precautions are consistent with the regulatory positions of RG 1.37, Revision 1.

3.1.14 Inspection, Test, and Operating Status

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.N, for establishing necessary measures to identify the inspection, test, and operating status of items and components within the scope of the QAPD to maintain personnel and reactor safety and avert inadvertent operation of equipment.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 14, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable

3.1.15 Nonconforming Materials, Parts, or Components

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.O, for establishing the necessary measures and governing procedures to control items, including services that do not conform to specified requirements, in order to prevent inadvertent use. Controls provide for identification, documentation, evaluation, segregation (when practical), disposition of nonconforming items, and notification to affected organizations.

Nonconformances are corrected or resolved before relying on the item to perform its intended safety function. Nonconformances are evaluated for impact on the operability of quality SSCs to ensure that the final condition does not adversely affect safety, operation, or maintenance of the item or service. Nonconformances to design requirements which are dispositioned "repair" or "use-as-is" are subject to design control measures commensurate with those applied to the original design. Nonconformance dispositions are reviewed for adequacy, analysis of quality trends, and reports provided to the designated management. Significant trends are reported to management in accordance with CB&I procedures, regulatory requirements, and industry standards.

In addition, the CB&I QAPD provides for establishing the appropriate interfaces between the QA program for identification and control of nonconforming materials, parts, or components, and the non-QA reporting program in order to satisfy the requirements of 10 CFR Part 52 and 10 CFR Part 21, "Reporting of Defects and Noncompliance."

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 15, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable

3.1.16 Corrective Action

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.P, for establishing the necessary measures and governing procedures to promptly identify, control, document, classify, and correct conditions adverse to quality. The QAPD provides for procedures to ensure that corrective actions are documented and initiated following the determination of conditions adverse to quality in accordance with regulatory requirements and applicable quality standards.

The CB&I QAPD also requires personnel to identify known conditions adverse to quality. Reports of conditions adverse to quality are analyzed to identify trends. Significant conditions adverse to quality and significant adverse trends are documented and reported to responsible management. In the case of a significant condition adverse to quality, the cause is determined, and actions to preclude recurrence are taken. In the case of suppliers working on safety-related activities, or other similar situations, CB&I may delegate specific responsibilities for corrective actions, but CB&I maintains overall responsibility for the effectiveness of corrective action measures.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 16, and the guidance in Section 17.5 without further clarifications or exceptions, and is therefore acceptable.

3.1.17 Quality Assurance Records

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.Q, for establishing the necessary measures to ensure that sufficient records of items and activities affecting quality are developed, reviewed, approved, issued, used, and revised to reflect completed work. The provisions of such procedures establish the scope of the records retention program for CB&I and include requirements for records administration including receipt, preservation, retention, storage, safekeeping, retrieval, access controls, user privileges, and final disposition.

The CB&I QAPD establishes measures to ensure that sufficient records of completed items and activities affecting quality are appropriately stored. The records and retention times are based on Regulatory Position C.1 of RG 1.28, Revision 4. In all cases where state, local, or other agencies have more restrictive requirements for record retention, the CB&I QAPD provides that those requirements will be met.

When using electronic records storage and retrieval systems, the CB&I QAPD provides for compliance with the NRC guidance contained in NRC Generic Letter 88-18, "Plant Record Storage on Optical Disks," Regulatory Issue Summary (RIS) 2000-18, "Guidance on Managing Quality Assurance Records in Electronic Media (Reference 10)," and the associated Nuclear Information and Records Management Association, Inc. (NIRMA) Technical Guidelines (TG), including TG 11-1998, "Authentication of Records and Media," TG 15-1998, "Management of Electronic Records," TG 16-1998, "Software Configuration Management and Quality Assurance," and TG 21-1998, "Electronic Records Protection and Restoration."

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 17, the guidance in Section 17.5, and regulatory positions stated in RG 1.28, Revision 4, without further clarifications or exceptions, and is therefore acceptable.

3.1.18 Audits

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.R, for establishing necessary measures to implement audits to verify that activities covered by the QAPD are performed in conformance with the established requirements. The effectiveness of the audit program is reviewed as part of the overall audit process. The QAPD provides measures to conduct periodic internal and external audits. Internal audits are conducted to determine the adequacy of the program and its procedures and to determine if they are meaningful and comply with the QAPD requirements. Internal audits are performed with a frequency commensurate with safety significance and in such a manner as to ensure that an audit of all applicable QA program elements is completed for each functional area within a period of 2 years after the initial determination that the audit program has been soundly established. External audits determine the adequacy of a supplier's or contractor's QA program. Responsible management reviews audit results; these reviews are documented.

Management responds to all audit findings and initiates corrective action where indicated. Where corrective actions are indicated, documented follow-up of applicable areas through inspections, review, re-audits, or other appropriate means is conducted to verify that corrective action have been adequately implemented.

The staff's review finds that in establishing its program CB&I commits to implement the quality standards described in NQA-1-2008, Requirement 18, the guidance in Section 17.5, and regulatory positions stated in RG 1.28, Revision 4, without further clarifications or exceptions, and is therefore acceptable.

3.2 Regulatory Commitments

The CB&I QAPD follows the guidance of Section 17.5, Paragraph II.U, for establishing QA program commitments. Furthermore, CB&I commits to comply with the following NRC RGs and other QA standards to supplement and support the QA program:

- RG 1.26, Revision 4, "Quality Group Classification and Standards for Water, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," dated March 2007. Regulatory Guide 1.26 defines classification of systems and components.
- RG 1.28, Revision 4, "Quality Assurance Program Requirements (Design and Construction)," dated June 2010. Regulatory Guide 1.28 describes a method acceptable to the NRC for complying with the provisions of Appendix B with regard to establishing and implementing the requisite QA program for the design of nuclear power plants.
- RG 1.29, Revision 4, "Seismic Design Classification," dated March 2007. RG 1.29 defines systems required to withstand a safe shutdown earthquake (SSE).
- ASME NQA-1-2008, and NQA-1a-2009 Addenda, "Quality Assurance Requirements for Nuclear Facility Applications," Parts I and II, as described above in Sections 3.1.1 through 3.1.18 of this safety evaluation.
- NIRMA Technical Guides, as described in Section 3.1.17 of this safety evaluation.

For projects which specify earlier versions of NQA-1 or ANSI N45.2 series standards or earlier versions of regulatory guides, by contract, CB&I commits to the appropriate versions that are required by the contract.

4.0 CONCLUSION

The CB&I QAPD follows the NRC guidance contained within, and conforms to the format of, Section 17.5. The NRC staff used the acceptance criteria of Section 17.5 as the basis for evaluating the acceptability of the CB&I QA program in conformance with the provisions of 10 CFR 50.4 and Appendix B to 10 CFR Part 50. On the basis of its review of the CB&I QAPD, the NRC staff concludes that:

- The CB&I QAPD adequately describes the authority and responsibility of management and supervisory personnel, performance and verification personnel, and self-assessment personnel, in relation to activities to which the CB&I QAPD is applicable.
- The CB&I QAPD adequately provides for organizations and personnel to perform verification and self-assessment functions related to CB&I activities that affect the quality of safety-related nuclear plant SSCs, as well as select nonsafety-related SSCs, with these organizations and personnel having the authority and independence to conduct activities without undue influence from those directly responsible for costs and schedules.
- The CB&I QAPD adequately applies to activities and items that are important to safety.
- The CB&I QAPD adequately establishes controls that, when properly implemented, comply with the requirements of Appendix B to 10 CFR Part 50, and 10 CFR Part 21, consistent with the criteria contained in Section 17.5, as well as the relevant regulatory guidance.

On the basis of its review, the NRC staff determined that the CB&I QAPD adequately describes the CB&I QA program. Accordingly, the NRC staff concludes that the CB&I QA program complies with the applicable NRC regulations and industry standards and can be used by CB&I for engineering, procurement and construction activities affecting the quality and performance of safety-related SSCs.

5.0 REFERENCES

1. NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants," dated March 2007 (Agencywide Document Access and Management System (ADAMS) Accession No. ML063190019)
2. CB&I submittal of topical report CMS-720-03-00020, Revision 0, in letter dated May 14, 2013 (ADAMS Accession No. ML13137A098)
3. CB&I request for information response in letter dated April 15, 2014 (ADAMS Accession No. ML14108A084)
4. CB&I additional response and update to CMS-720-03-00020, dated June 3, 2014 (ADAMS Accession No. ML14156A405)
5. ASME NQA-1-2008, "Quality Assurance Program Requirements for Nuclear Facilities" (with a2009 Addenda), New York, NY, dated March 14, 2008
6. RG 1.28, Revision 4, "Quality Assurance Program Criteria (Design and Construction), dated June 2010 (ADAMS Accession No. ML100160003)

7. NRC Generic Letter 1988-18, "Plant Record Storage on Optical Disks," dated October 20, 1988
8. RIS 2000-18, "Guidance on Managing Quality Assurance Records in Electronic Media," dated October 23, 2000 (ADAMS Accession No. ML003739359)
9. RG 1.189, Revision 2, "Fire Protection for Operating Nuclear Power Plants," dated October 2009 (ADAMS Accession No. ML092580550)
10. NRC Generic Letter 1985-06, "Quality Assurance Guidance for ATWS Equipment That Is Not Safety Related," dated January 16, 1985
11. RG 1.155, "Station Blackout," dated August 1988
12. RG 1.26, Revision 4, "Quality Group Classification and Standards for Water, Steam-, and Radioactive-Waste-Containing Components of Nuclear Power Plants," dated March 2007 (ADAMS Accession No. ML070290283)
13. RG 1.29, Revision 4, "Seismic Design Classification," dated March 2007 (ADAMS Accession No. ML070310052)

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