

Tennessee Valley Authority, Post Office Box 2000, Spring City, TN 37381-2000

July 8, 2009

U.S. Nuclear Regulatory Commission ATTN: Document Control Desk Mail Stop: OWFN P1-35 Washington, D.C. 20555-0001

In the Matter of Tennessee Valley Authority Docket No. 50-391

WATTS BAR NUCLEAR PLANT (WBN) UNIT 2 - RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION ON PROGRAM FOR CONSTRUCTION REFURBISHMENT (TAC NO. MD6581)

References: 1. TVA letter dated December 9, 2008, "Watts Bar Nuclear Plant (WBN) -Unit 2 - Licensing Basis Preservation and Construction Refurbishment Program for Structures, Systems and Components (SSCs) (TAC NO. MD6311)"

> NRC letter dated April 28, 2009, "Watts Bar Nuclear Plant, Unit 2 – Request for Additional Information on Programs for Licensing Basis Preservation and Construction Refurbishment (TAC NO. MD 6581)"

In Reference 1, TVA submitted Procedure 25402-000-GPP-0000TI216, "Watts Bar Unit 2 Completion Project Refurbishment Program" (TI216). In Reference 2, NRC requested that TVA provide a discussion of the rationale for the selection of components to be refurbished based on the expected degradation mechanisms and the guidance that will be used to ensure the objective and consistent application of refurbishment activities.

Most of the WBN Unit 2 safety-related and quality-related equipment was installed during original construction. TI216, as amended, is designed to ensure that the equipment is still capable of performing its required function in accordance with design specifications. The WBN Unit 2 Completion Project will perform inspections/evaluations, refurbishment, replacements, and system testing to ensure the plant meets its original design specifications. The safety-related and quality-related SSCs will be inspected/evaluated for pre-service degradation in accordance with the requirements of TI216 to ensure that the item is capable of meeting its design specifications.



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The implementing procedures are being prepared or revised to align with TI216, the upper tier procedure. Enclosed is the revised TI216.

If you have any questions, please contact me at (423) 365-2351.

Sincerely,

Masoud Bajesta

Watts Bar Unit 2 Vice President

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TVA WATTS BAR NUCLEAR UNIT 2 CONSTRUCTION COMPLETION PROJECT PROCEDURE

Unit 2

Construction Refurbishment (CRF)

25402-000-GPP-0000-TI216

Watts Bar Unit 2 Completion Project Refurbishment Program

Revision 0002

Level of Use: Information Use

Quality Related: Yes 🗹 No 🗂

ASME: Yes 🗹 No 🗇

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Revision Log

Revision or Change Number	Effective Date	Affected Page Numbers	Description of Revision/Change
0000	11/05/2008	All	Initial issue
0001	06/24/09	All	This revision is a major rewrite. Revised, renumbered pages and added Attachments on Table of Contents. Changed (2) approvers on the cover sheet (Bill Crouch and Jim Robertson replace Roger Poole and Dave Tooker, respectively). Section 1.0, 2.0 and 6.0 rewritten. Section 3.0, added new definitions for Classification, Evaluation, Identification, Pre-Service Degradation, Replacement, and System Testing. Listed in alphabetical order. Added 2nd sentence for Inspections, added 'buffing' to Cleaning, added to 2nd sentence of Refurbishment and added 'component specific' to Component Testing. Added TI-12.08 and TI-404 to Section 4.0. Replaced SPP-9.2 with N-1106 and added QCD-0001 in Section 4.0. Section 5.0, added PEM and Project Eng. Added 1st bullet at PFE and added to sentence at 3rd bullet. PFE chg'd to primary contact for ANI. At Refurb FE, added 1st and 4th bullets. Removed PFQCE and QCE from Section 5.0. At Subsection 6.1, added the word 'testing' to 1st sentence of 2nd paragraph and added 2nd sentence to 2nd paragraph. At Subsection 6.2, replaced Exclusions with Process and added 6.2.1, 6.2.2, 6.2.3, 6.2.4 and 6.2.5. Added Attachments 1, 2, 3 and 4. Added Active or Passive throughout procedure.
0002	7.7.09	1, 2, 4, 5, 6, 8, 11, 12, 13, 14, 15, 16, 18, 30 through 41	Chg'd TVA from 'Concurrence' to 'Reviewer' on cover sheet. Section 1.0, removed major rewrite note. Subsection 1.0.A, added 'original licensing' and replaced 'design' with 'vendor'. Reworded and expanded Subsection 1.0.C. Reworded and expanded last sentence of Subsection 1.0.D. Section 2.0 divided into four paragraphs, reworded and removed the word 'but' form 2nd and 3rd sentence of last paragraph, and removed the word 'via' from 5th sentence. Section 3.0, expanded definition of Component Testing, added Corrective Action Program definition, and redefined Equipment Functional Status. Added Subsections 4.0M, 4.0N, 4.0O AND 4.0P. Added to Section 6.2. Subsection 6.2.1, added 3rd and last sentence to 1st paragraph and removed 1st sentence. Subsection 6.2.3, added 'licensing' to 1st paragraph, added 2nd, 4th, 8th and 12th paragraphs, added 'pre- service to 3rd paragraph, revised and added to 9th paragraph, added last sentence to 10th paragraph, added 'contactor oxidation', and last three sentences to paragraph 13, added 'expected' to 1st sentence and added 2nd and 3rd sentence to 15th paragraph. Added 5th paragraph to Subsection 6.2.4. Expanded Subsection 6.2.5. Subsection 6.3, added Form N-5 and Data Reports N-1, N-2, NPV-1, NPP-1. Added 2nd paragraph to Section 7.0. Revised Attach 1. Attach 3, added 'Tracking Process' to header and added 'CAP', 'Eng Report' and 'Ref 4.0F' to 1st column.

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1.0 PURPOSE

- A. This instruction provides the guidance for the Watts Bar Unit 2 Construction Completion Project (WB2CCP) refurbishment program for active and passive safety related, quality related and non-quality related equipment. This instruction also identifies requirements for evaluation of pre-service degradation of active and passive safety related, quality related and non-quality related equipment which will not be replaced or refurbished. Most of the equipment was installed during the original construction period. Since layup activities were terminated for a period of time after 2001, it is necessary to ensure the equipment is still capable of meeting its required specifications. The project will perform inspections / evaluations, refurbishment / replacements, and system testing to ensure the plant meets its original licensing, design and equipment vendor specifications.
- B. The refurbishment program consists of five steps:
 - 1. identification
 - 2. classification
 - 3. inspection / evaluation
 - 4. refurbishment / replacement
 - 5. component / system testing
- C. Unit 2 equipment found to be acceptable (i.e, capable of meeting its licensing, design and vendor specification) via inspection/evaluation will be tracked either via Reference 4.0F or via a separate engineering report for a Corrective Action Program (CAP), Special Program or other individual commodity report. Equipment which will be refurbished to meet its design and vendor specifications will be identified and then tracked/processed via reference 4.0F.
- D. Criteria are provided for the various types of inspections / evaluations for each type of equipment / component coupled with detailed implementing instructions provided in lower tier procedures. The engineering programs and reference 4.0F will provide the guidance as the lower tier implementing procedures, as appropriate. The specific inspection/refurbishment activities required for a given component will require review of the licensing, design and vendor requirements and specifications, vendor manuals and other vendor technical documents, and applicable code requirements.

2.0 SCOPE

This instruction applies to all active and passive WBN Unit 2 safety related, quality related and non-quality related equipment required for Unit 2 operation. This equipment falls into two groups. The first group consists of those structures, systems (or portion of systems), and components (SSCs) that are shared between Unit 1 and Unit 2 (common equipment) and are in operation supporting Unit 1. The second group consists of the remaining Unit 2 SSCs which have not been in operation to support Unit 1.

The population of the first group of SSCs is defined, monitored, trended, and reported in accordance with the Unit 1 Maintenance Rule requirements. The Unit 1 Maintenance Rule Program monitors the performance or condition of structures, systems, and components, against performance criteria, in a manner sufficient to provide assurance that such SSCs are capable of fulfilling their intended function. Examples of common SSCs currently in service are the Emergency Diesel Generators, Essential Raw Cooling Water pumps and isolation valves, Diesel Generator Building, Intake Pumping Station, Control Building and Auxiliary Building.

Some of the Unit 2 piping on the Unit 1 side of the Unit 1/2 operational boundary has been filled with water but under stagnant conditions since Unit 1 startup. This piping which has been monitored under the Unit 1 Maintenance Rule Program will be identified and confirmed to be satisfactory for Unit 2 operation. This confirmation will consist of inspections, flushes and/or ultrasonic test (UT) inspections of the affected piping as described below.

All SSCs required for Unit 2 operation shall be identified using the Unit 1 and Unit 2 Master Equipment List (MEL) and the associated unique identifiers (UNIDs). SSCs associated with the first group (i.e., inservice supporting Unit 1 operation) will be identified and then excluded from this procedure since they are currently monitored by the Unit 1 program which ensures that the equipment will be capable of meeting its design criteria. In the second group, non-licensed Unit 2 equipment which has been or will be replaced prior to startup will be identified and then excluded from this procedure since the new equipment will not be subject to pre-service degradation due to the relatively short time span from installation to system startup. For the remaining Unit 2 equipment, some items will be refurbished while others will be inspected / evaluated. Refurbishment will be conducted in accordance with Reference 4.0F to restore a component to its licensing/design specifications or vendor specifications (i.e. restore to like new performance). The rest of the safety related and guality related SSCs will be inspected / evaluated for pre-service degradation in accordance with the requirements of Attachment 3 and documented as discussed in Section 6.2.3 to ensure that the item is capable of meeting its design specifications and vendor functional specifications.

3.0 **DEFINITIONS**

Classification - The process of categorizing equipment / components into functional categories of equipment / components (e.g., structures, pumps, motors, valves, chillers, piping, hangers, transmitters, controllers etc.).

Cleaning - Removal of dirt and other contaminants using pressurized air, water, approved solvents, buffing, etc., as necessary.

Component Testing - Industry standard or special component tests consisting of actions such as instrument calibrations, flushing, and functional testing of individual components (i.e., air operated valves, motor operated valves, electrical motors, etc) intended to demonstrate compliance with component specific specifications and requirements.

Corrective Action Program/Special Program - A program described in the Nuclear Performance Plan, Volume 4 to correct equipment and programmatic related deficiencies identified by TVA and the NRC prior to Unit 1 operation.

Design Criteria - The requirements that ensure the system, structures and components meet the parameters of the safety analyses.

Equipment Functional Status - A component having any subpart which can physically move will be considered "active" (versus "passive") regardless of its need to move to support plant operation or safety analyses. Components having no moving parts will be considered "passive".

Evaluation - The process for determining if the applicable pre-service degradation mechanism has impacted the associated equipment / component's ability to meet its original design specifications.

Excluded Equipment / Components - Equipment / Components to be replaced with new equipment / component or equipment in service supporting Unit 1.

Identification - Identification of all safety related, quality and non-quality related equipment / components required for Unit 2 operation and equipment / components required for dual unit operation (i.e., Unit 2 or common (Unit 0) equipment currently in service to support unit 1 operation).

Inspections - Disassembly to the extent necessary to verify or measure critical attributes which may be affected by time, cleanliness, conditions of bearing or seating surfaces or components. Inspections include both internal and external aspects of the item.

Lubrication - Removal of old grease / oil from reservoirs, bearings, and other lubricated components and replacement with vendor specified or other engineering approved lubricants.

3.0 **DEFINITIONS** (continued)

Pre-Service Degradation - Degradation mechanisms (e.g., physical damage, corrosion, hardening of grease or gaskets, etc) that have affected previously installed Unit 2 equipment which has not been in service and which may prevent equipment / components from meeting design specifications or vendor specifications.

Refurbishment - Performance of activities to restore a component to its design specifications or vendor specifications (i.e. restore to like new performance).

Replacement - Replacement of degraded equipment and / or parts which are not expected to meet the equipment's specifications or which would potentially fail over time, such as gaskets, packing, elastomers, etc. Replacements can also occur as either part of modifications to make Unit 2 equipment match equipment in Unit 1 or to replace obsolete/missing Unit 2 equipment or as a result of historical document issues such as 10 CFR Part 21, construction deficiencies, PERs, etc.

System Testing - NRC Regulatory Guide 1.68 testing to demonstrate that the plant systems are capable of meeting the applicable system design criteria. The NRC Regulatory Guide 1.68 test program, while a demonstration of overall system and component readiness for operation, will not be tracked by this program.

4.0 **REFERENCES**

- A. WB2CCP Bechtel Nuclear Quality Assurance Manual (PNQAM)
- B. Bechtel Nuclear Quality Control Manual (NQCM)
- C. WB2CCP Bechtel Construction Operations Incorporated (BCOI) Bechtel Quality Assurance Manual (BQAM) ASME Section III Division 1 - Part 2, Addenda
- D. WB2CCP Bechtel Power Corporation (BPC) Bechtel Quality Assurance Manual (BQAM) ASME Section III Division 1 Part 2, Addenda
- E. Construction Completion Project Procedure (CCPP) 25402-000-GPP-0000-N1206, *Work Order Processing*
- F. CCPP 25402-000-GPP-0000-N1302, Component Refurbishment Evaluation
- G. CCPP 25402-000-GPP-0000-N3505, Piping System Cleanliness
- H. CCPP 25402-000-GPP-0000-N1106, Equipment Environmental Qualification
- I. CCPP 25402-QCD-0001, Project Nuclear Quality Control Plan
- J. TVA Technical Instruction TI-12.08, Control of Unit Interfaces
- K. TVA Technical Instruction TI-404, Unit Two Separation During Construction / Startup
- L. NEI 95-10, Appendix B, Typical Structure, Component and Commodity Groupings and Active / Passive Determinations for the Integrated Plant Assessment
- M. CCPP 25402-MGT-0003, Corrective Action Program
- N. TVA Startup Manual Procedure SMP 8.0, *Packaging and Processing Test Results*
- O. TVA Startup Manual Procedure SMP 11.0, Component Test Program
- P. TVA Startup Manual Procedure SMP 12.0, Preoperational Test Matrix

5.0 **RESPONSIBILITIES**

- Project Engineering Manager (PEM)
 - The PEM is responsible for approval of this procedure.
 - The PEM is responsible for ensuring that the requirements of this procedure are properly implemented.

5.0 **RESPONSIBILITIES** (continued)

CRF

The PEM is responsible for obtaining TVA Engineering concurrence on the scope of activities for each category of equipment in Attachment 3.

Construction Manager (CM)

The CM is responsible for approving and ensuring that the requirements of this procedure are implemented in lower tier implementing procedures.

Project Field Engineer (PFE)

- Implementing this procedure with lower tier implementing procedures.
- Assigning and supervising the Field Engineering personnel assigned to provide technical support.
- Assuring that assigned personnel have the required training and experience to implement the requirements of this procedure and the lower tier implementing procedures
- Implementing this procedure and providing project direction and technical assistance for the Refurbishment Field Engineers
- The PFE is the primary contact with the ANI on the project site.

Project Field Quality Control Engineer (PFQCE)

Responsible for providing technical and administrative guidance to Quality Control Engineer (QCE's).

Quality Control Engineer

- Perform quality related inspections for those activities that are classified as Safety Related and Quality Related.
- Prepare quality control documentation and maintain quality control records.

Refurbishment Field Engineer

- Using Reference 4.0F, prepares a listing of initial scope of components in accordance with the scope of this procedure.
- Proposes a determination of refurbishment requirements.
- Ensures, after approval of the scope and evaluation that WO's are prepared to accomplish the activities and are in a retrievable database type program.

5.0 **RESPONSIBILITIES (continued)**

• Ensures the results of the refurbishments are documented as described in this procedure.

Project Refurbishment Group Manager

• Responsible for direction and oversight of the refurbishment group, including processes for scope identification and control, work item evaluations, work order planning and execution, and tracking of item completion.

Project Engineering

- Provides program level input and oversight.
- Reviews and concurs with the scope determination and refurbishment evaluations.
- Evaluates commodities / features which do not have UNID's. Based on evaluations, recommends accept-as-is, refurbish or replacement as appropriate.

6.0 **REQUIREMENTS**

6.1 General Requirements

It is critical that all personnel performing activities associated with construction completion at WBN2 be aware of the importance of maintaining "Unit Separation" and have no effect on Unit 1 or common systems and components. Refer to TVA procedure TI-404, *Unit Two Separation During Construction / Startup* and TI-12.08, *Control of Unit Interfaces.*

In general, refurbishment will involve inspections, cleaning, flushing, lubrication, replacement of shelf life limited parts (such as gaskets, packing, elastomers etc.) and testing. In some cases, it may be more economical to replace whole components rather than refurbish sub-parts of a component. Consideration shall be given to specific engineering requirements such as environmental qualification (EQ) when establishing the refurbishment activities required for specific components. Lessons learned for reliability issues noted during Unit 1 operation will also be considered while establishing refurbishment activities for a given component.

6.2 Process

Attachment 1 contains a work process flow chart as described below.

6.2 **Process (continued)**

The process will identify all equipment required to operate Unit 2. The process will then identify equipment currently addressed by Unit 1 Maintenance Rule programs. If this equipment is capable of meeting its licensing / design / vendor specifications, no further action is required. Otherwise, this equipment is refurbished/replaced.

The Unit 2 specific equipment is categorized using the criteria in Attachment 2 and a predetermination made as to whether a refurbishment/replacement will be performed. Equipment which is expected to only require inspection/evaluation is also denoted in Attachment 2. For equipment which will be inspected / evaluated, Attachment 3 provides the inspections which will be performed and the expected degradation mechanisms.

The details of this process are provided below.

6.2.1 Identification

Identification of all WBN Unit 2 safety related, quality related and non-quality related equipment required for Unit 2 operation will be accomplished using the Unit 2 Master Equipment List (MEL). Similarly, the identification of all safety related, quality related and non-quality related equipment currently in service to support Unit 1 operation but required for Unit 2 and / or dual unit operation (e.g., common equipment) will utilize the Unit 1 MEL. Equipment which is quality related only due to Seismic II / I issues will be considered as non-quality related equipment for the purpose of this procedure except for Seismic II / I related parameters. The identified equipment will be documented by unique equipment identifier (UNID) in an equipment matrix / form in accordance with Reference 4.0F. (Interface Points and isolations will be included in this procedure). Quality Assurance will perform oversight on this process as required by References 4.0A, 4.0C and 4.0D.

Some plant features (e.g., piping/tubing, pipe supports, conduit/conduit supports, concrete, coatings, etc) do not have UNIDs but will be addressed on a commodity type basis. Items which do not have UNIDs will be identified by Engineering within the appropriate Engineering programs (e.g., IE Bulletin 79-02/14, HVAC duct Corrective Action Program, Coatings Program, etc).

Additionally, equipment / components to be replaced (i.e., new equipment) are then excluded from the scope of the below process since no pre-service degradation would have occurred. These determinations will be documented in the equipment matrix / form.

The above process of identifying the affected Unit 2 equipment will be documented via Reference 4.0F and the associated engineering programs.

6.2.2 Classification

As shown in Attachment 2, the equipment / components have been divided into functional categories of equipment / components (e.g., structures, pumps, motors, valves, chillers, piping, pipe hangers, transmitters, controllers, etc.) using the function codes contained in MEL (Attachment 4). For those items which do not have UNIDs (e.g., piping / tubing, pipe supports, conduit supports, concrete, coatings, etc.), the commodity type has been used. The category assignments for safety related and quality related commodities are documented in the equipment category matrices grouped for mechanical, electrical, and I&C equipment / components and civil components / structures (Attachment 2).

6.2.3 Inspection / Evaluation

For equipment which will be refurbished, the licensing/design specifications and vendor technical documents will be used via Reference 4.0F to ensure the equipment is capable of meeting its original licensing / design / vendor functional requirements. Refurbishment will restore a component to a like new condition. No other inspection / evaluation is required for this equipment. For inspections which require disassembly, work will be performed in accordance with References 4.0E and 4.0F.

As shown in the first column of Attachment 3, the inspections / evaluations for each Category will be tracked via either the matrices created by Reference 4.0F for components having UNIDs or by CAPs / Special Programs or Engineering Reports for components not having specific UNIDs. Quality Assurance will perform oversight on this process as required by References 4.0A, 4.0C and 4.0D.

For equipment which will be inspected/evaluated, pre-service degradation criteria have been developed for equipment/components based on material types, equipment / component locations, conditions experienced since original installation (e.g., dry or wetted), and equipment / components functional status (i.e. active or passive). Applicable expected pre-service degradation mechanisms are identified for each combination of material type, location, equipment condition and functional status. The PEM is responsible for obtaining TVA Engineering concurrence on the scope of activities for each category of equipment in Attachment 3. Concurrence will be documented in accordance with Reference 4.0F.

Equipment / components in service supporting Unit 1 which are covered by a regulatory program (e.g., Maintenance Rule, Surveillance Instructions, performance monitoring, etc) are evaluated to ensure they will be capable of meeting their Unit 2 required functions. If the equipment is found to not be capable of meeting its licensing / design functions, the component will be replaced/refurbished as described below.

As implemented by the engineering programs, the material types will be established based on direct observation and / or Bill of Materials. The equipment locations will be based on issued plant drawings.

6.2.3 Inspection / Evaluation (continued)

The determination of wetted versus dry will be based upon a review of the system isolation points (e.g., closed valves, blind flanges, blanking plates, etc) with consideration for the potential for water leakage (i.e., leak by). If evidence of wetting is confirmed, the component will receive further inspection / evaluation.

The inspection activities under the guidelines of the engineering programs will be a combination of actual inspections (e.g., direct visual, borescope, chemical swipes / analyses, etc) and component specific testing (e.g., bridge, megger, hi-pot, etc). These inspections and component tests will be used to establish the current capability of the equipment to meet its design criteria requirements for its specified life. The inspections and tests for passive components will be performed on a sample basis.

Inspections / evaluations for quality related seismic II / I will consider only preservice degradation mechanisms related to seismic II / I considerations.

The inspection matrix for safety related and quality related commodities by category (Attachment 3) contains the special inspection / test criteria applicable to each preservice degradation mechanism for the associated equipment / component or commodity type. The specified life can be either the 40 year licensed life of plant or a shorter approved qualified life. For example, safety related electrical equipment subject to 10CFR 50.49 Environmental Qualification is sometimes qualified to a period shorter than 40 years with required periodic replacements.

Items which do not have UNIDs (e.g., piping / tubing, pipe supports, conduit / conduit supports, concrete, coatings, etc) will be evaluated by Engineering within the appropriate Engineering programs (e.g., IE Bulletin 79-02 / 14, HVAC duct Corrective Action Program, Coatings Program, etc). Attachment 3 denotes which program / procedure will perform the applicable inspection/evaluation and track the results.

Mechanical / Civil components that are comprised of metal components are subject to loss of material, cracking, change in material properties (e.g., reduction of fracture toughness, distortion), fouling and physical damage (arc strikes, gouges, etc). Loss of material will evaluate for general corrosion, galvanic action, crevice corrosion, pitting, and MIC. Loss of material due to erosion/corrosion (i.e., FAC) or boric acid wastage is not credible since the plant has not operated. Cracking is not credible since the plant has not operated. Cracking is not credible since there has not been hydrogen introduced into the systems, there is no operational stress to induce stress corrosion cracking and no fatigue cycles have been experienced on the Unit 2 systems. Change in material properties due to phenomena such as radiation embrittlement, operational thermal aging, etc. is not credible since Unit 2 has not experienced operational conditions. Fouling and material loss due to MIC will be evaluated based on the Unit 1 / 2 boundaries and the potential for wetting from sources such as valve leak through.

6.2.3 Inspection / Evaluation (continued)

Walkdowns performed in accordance with 79-02 / 79-14, from 2007 to 2009 to determine the construction status of Unit 2 concluded that the existing piping and support configurations were adequate such that no pipe sagging had occurred which could have resulted in damage to equipment nozzles or other piping components. The piping had been supported to withstand the design basis earthquake (seismic support requirements) which would have been more than enough support to prevent equipment damage.

Electrical components are comprised of conducting materials (e.g., cables, penetrations, hand switches, terminal blocks, relays, etc) or the associated insulating material. These components are subject to degradation due to thermal and radiation effects, contactor oxidation and surface contamination. The Unit 2 electrical equipment is located in areas which experience normal controlled/ambient environmental conditions. The components were not energized and thus did not experience self induced operational heating. The cables are not located in areas of the plant which are subject to minimal radiation from Unit 1. The effects of actual ambient temperature, heating due to energized Unit 1 cables, and Unit 1 related radiation will be accounted for in the qualified life calculations. For cables external to the buildings, the effects of external environments will be included. Chemical swipe samples will be performed to determine if surface contamination is present. Contactor oxidation as well as the functionality of non-moving components (e.g., resistors, capacitors, integrated circuits, etc) are demonstrated via component/system testing. For electrical components, the testing is the primary means of verifying component capability. The visual inspections are performed in support of the testing.

Civil components that are comprised of concrete are subject to preservice degradation due to material loss (i.e., freeze-thaw, abrasion or cavitation, elevated temperature, aggressive chemicals, and corrosion of embedded steel and steel reinforcement), cracking (freeze-thaw, reaction with aggregates, shrinkage, settlement, elevated temperature, irradiation, and fatigue), change in material properties (i.e., leaching of calcium hydroxide, aggressive chemicals, elevated temperature, irradiation, and creep). Change in material properties due to phenomena such as elevated temperatures, cavitation, fatigue, irradiation or creep is not credible since Unit 2 has not experienced operational conditions.

6.2.3 Inspection / Evaluation (continued)

The results of the inspections / test will be evaluated to determine if the applicable, expected pre-service degradation mechanism has impacted the associated equipment / component to verify the equipment will be capable of meeting its specified life. If the equipment is found to not be capable of meeting its required design/licensing/vendor requirement, a Problem Evaluation Report (PER) shall be initiated in accordance with References 4.0M. If an unexpected degradation mechanism is identified, a PER shall be generated in accordance with References 4.0M. The results of the evaluations will be documented in accordance with References 4.0F. Equipment whose evaluation determines that it will not be capable of meeting its design criteria for its specified life will receive appropriate refurbishment or replacement as described below.

Cleanliness of piping systems will be established during flushes in accordance with flushing procedures. (See Reference 4.0G)

6.2.4 Refurbishment / Replacement

The following discusses 1) the equipment/components which have been predetermined to be refurbished or replaced and 2) the equipment which will be inspected and then determined to require refurbishment.

For equipment/components which have been predetermined to be refurbished, cleaning, lubrication and replacement of consumable parts such as gaskets or seals will be performed as required per vendor technical requirements to ensure the equipment is capable of meeting its technical requirements.

The inspections performed to support refurbishment / replacement for quality related seismic II / I commodities shall consider preservice degradation mechanisms related to the seismic II / I characteristics of the commodity.

A Refurbishment Scope Evaluation Form (from Reference 4.0F) will be prepared for each component. The documents will list the components and denote which will be refurbished and those that will be replaced. The refurbishment scope form will record applicable information on the component such as the specific refurbishment activities to be performed, special considerations, work documents and / or procedures to be utilized, and the basis for the determination.

Concurrence of the Refurbishment Scope Evaluation Form will be obtained from Project Engineering. Additional approvals from program owners (electrical equipment qualification (EQ), mechanical equipment qualification (MEQ), Generic Letter (GL) 89-10, ANI, etc.) may be specified by project engineering. Complete component replacement (like for like or design issued) will not require engineering or program owner approval when specified in lieu of refurbishment.

If during refurbishment an unexpected degradation mechanism is identified, a PER shall be generated.

6.2.4 Refurbishment / Replacement (continued)

For equipment expected to be accepted based on inspections/evaluation, if the equipment has experienced no detrimental pre-service degradation, it will be documented as acceptable and no further action is required. If unacceptable degradation has occurred, the equipment will be refurbished or replaced to ensure it will be capable of meeting its design criteria. Replacement items will be procured using current design criteria.

6.2.5 Component / System Testing

Prior to Unit 2 operation, industry standard or special component tests will be performed consisting of actions such as motor bumps for rotation, instrument calibrations, flushing, and functional testing of individual components (i.e., air operated valves, motor operated valves, electrical motors, logic scheme checks, etc). The tests as directed by reference 4.00 are intended to demonstrate compliance with component specific specifications and requirements. System flushes, system hydros, and the system Preoperational Test programs performed in accordance with NRC Regulatory Guide 1.68 serve as the confirmation of the component's capability to meet its design criteria. References 4.0N and 4.0P direct the Regulatory Guide 1.68 test program.

6.3 ASME Section III Special Requirements

Refurbishment of ASME Section III components will require reference to the original Code Data Report (ASME Form N-5, NPV-1 or N-1). For ASME Section III components, the scope of work must be reviewed to determine whether the work includes ASME Section III activities. ASME activities are generally limited to repair by welding of pressure boundary items and replacement of pressure boundary parts or material. Mechanical disassembly and reassembly to replace gaskets, seals, and bearings are not ASME Section III activities. Although refurbishment of ASME Section III components will require Quality Control (QC) review, only the ASME Section III work requires Authorized Nuclear Inspector (ANI) review. Generally, any component disassembly for inspection and restoration activities must be at the component designed disassembly points (i.e. - bolted or flanged surfaces).

The ASME Section III work shall be documented on an ASME Data Report (e.g., N-1, NPV-1, N-5, etc) by the ASME Certificate Holder. For components with Original Equipment Manufacturer (OEM) Data Reports (N-1, N-2, NPV-1, NPP-1, etc), a supplement to the Data Report shall be prepared.

7.0 RECORDS

No QA records are created by this procedure. Documents described in this process are controlled by their respective governing program document requirements.

7.0 **RECORDS** (continued)

QA records that document the identification, classification, inspection / evaluation, refurbishment/replacement and testing will be created by the lower tier implementing procedures or contained in the Engineering Reports for the CAPs / Special Programs or other Engineering Reports.

8.0 ATTACHMENTS

A. Attachment 1 - Work Process Flow Chart

- B. Attachment 2 Equipment / Component Functional Categories
- C. Attachment 3 Inspection Matrix
- D. Attachment 4 Function Code List

Attachment 1 (Page 1 of 1)

Work Process Flow Chart



Attachment 2 (Page 1 of 11)

Equipment / Component Functional Categories

Civil									
FUNCTION	CATEGORY	ACTIVE /	SUB	AC	TION REQ	UIRED			
		PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ		
			Structural Steel	N/A	N/A	Inspect	N/A		
			Welds	N/A	N/A	Inspect	N/A		
			Anchor Bolts	N/A	N/A	Inspect	N/A		
			Concrete	N/A	N/A	Inspect	N/A		
CTSP, EQSP, HGR, PSP,	Supports	Passive	Grout	N/A	N/A	Inspect	N/A		
SUPP			Unistrut	N/A	N/A	Inspect	N/A		
			Base Plate	N/A	N/A	Inspect	N/A		
			Manufactured component (i.e. Springs, pipe clamps, struts, spring cans)	N/À	N/A	Inspect	N/A		
SNUB, SHKA	Snubbers	Active	. N	/A	N/A	Refurbish	Refurbish		
			Platforms	N/A	N/A	Inspect	N/A		
PL, PLTF,	Charles to and		Building Steel	N/A	N/A	Inspect	N/A		
SCVL, STRU, WELD	Steel	Passive	Miscellaneous Steel	N/A	N/A	Inspect	N/A		
			Welds	N/A	N/A	Inspect	N/A		
			Bolting	N/A	N/A	Inspect	N/A		
			Floor Slabs	N/A	N/A	Inspect	N/A		
			Walls	N/A	N/A	Inspect	N/A		
	Concrete	Passive	Concrete Structures	N/A	N/A	Inspect	N/A		
,			Pads	N/A	N/A	Inspect	N/A		
			Rebar	N/A	N/A	Inspect	N/A		
			Foundations	N/A	N/A	Inspect	N/A		

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Civil										
FUNCTION	CATEGORY	ACTIVE /	SUB	SUB SUB	AC	TION REQU	JIRED			
FUNCTION	CATEGORT	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ			
			Ice Cond. Iower Doors	N/A	N/A	Inspect	N/A			
BLKT	Doors (Ice Condenser)	Active	lce Cond. Intermediate Doors	N/A	N/A	Inspect / Replace	N/A			
			Blanket	N/A	N/A	Replace	· N/A			
· · · · ·			Doors (manual opening)	N/A	N/A	Inspect	N/A			
DGP, DOOR, DSL, EQH,	Doors & Hatches	Doors & Active	Doors (Solenoid Operated, Motor Operated)	N/A	N/A	Inspect	N/A			
			Hatches	N/A	N/A	Inspect	N/A			
MNWY			Blowout Panels	N/A	N/A	Inspect	N/A			
			RR Bay Hatches	N/A	N/A	In-service	N/A			
			Roll-up Doors	N/A	N/A	In-service	N/A			
			Gates	N/A	N/A	In-service	N/A			
			Blowout Door Seals	N/A	N/A	Inspect	N/A			
		Seals -	Divider Bearer Seals	N/A	N/A	Inspect	N/A			
EXPJ	Seals		Expansion Joints	N/A	N/A	Inspect	N/A			
			Door Seals	N/A	N/A	Inspect	N/A			
CRN, LDCL, LDVX, BRK	Cranes	Active	N/A	N/A	N/A	Refurbish	N/A			
BSKT	Basket (Ice)	Passive	N/A	.N/A	N/A	Inspect	N/A			

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	Electrical								
FUNCTION	CATEGORY	ACTIVE /	SUB	SUB SUB	ACTI	ON REQU	RED		
		PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ		
BAT	Battery	Active	N/	A	N/A	In-service	N/A		
			Molded Case	N/A	N/A	Replace	N/A		
BKR	Breaker	Active	Switch Gear	N/A	N/A	Refurbish	N/A		
		Passivo	Cable (Medium	Underground	Inspect, Evaluate QL	In-service	N/A		
		1 035100	Voltage)	Above Ground	Inspect, Evaluate QL	Inspect	N/A		
CABL	Cable	Passive	Cable (Low Voltage Control and Power)	N/A	Inspect, Evaluate QL	Inspect	N/A		
		Passive	Cable (Shielded Instrument)	N/A	Inspect, Evaluate QL	Inspect	N/A		
		Passive	Cable (Multi Axial)	N/A	Replace	Inspect	N/A [*]		
CHGR	CHARGER, BATTERY	Active	, N/	A	N/A	In-service	N/A		
DIO	Blocking Diode (Relaying)	Active	Diode	N/A	N/A	Inspect	N/A		
			MCC E	Bucket	N/A	Replace	N/A		
CNTR, STR	Contactor	Active	Misc.		N/A	Refurbish / Replace	N/A		
sw	Disconnect	Passive	N/	A	N/A	Inspect / Replace	N/A		
FU	Fuse	Passive	N/	A	N/A	Replace	N/A		

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	Electrical							
FUNCTION	CATEGORY	ACTIVE /	SUB		SUB SUB	ACTIO	N REQUIF	RED
	CATEGORY	PASSIVE	DESCRIPTIC	DN	DESCRIPTION	EQ	SR/QR	MEQ
HS, XS, XSW	Hand Switch	Active		N/A		Inspect / Replace / Verify QL	Inspect / Replace	N/A
HTR	Heater	Active	N/A		N/A	Inspect	N/A	
HTR	H2 Igniter			N/A	۱	N/A	New	N/A
			Medium Voltage		N/A	Refurbish/ Adjust QL	Refurbish	N/A
MTR	Motor	Active	Low 480V		Other	Refurbish/ Verify QL / Replace	Refurbish / Replace	N/A
			Low 120V		N/A	Refurbish/ Verify QL / Replace	Refurbish / Replace	N/A
PENT	Penetration (Electrical)	Passive		N/A		Inspect / V Repl	′erify QL / ace	N/A

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Electrical								
FUNCTION	CATEGORY	ACTIVE /	SUB	SUB SUB	ΑΟΤΙ	ON REQU	RED	
		PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	
			• •	Pneumatic	N/A	Replace	N/A	
			Time Delav	Electronic	N/A	Replace	N/A	
RLY, ARB,			Time Delay	Electro Mechanical	N/A	Refurbish / Replace	N/A	
TDDO, TDPU, Various	Relay	Active	Protective	Electro Mechanical	N/A	Refurbish / Replace	N/A	
Numeric Designators			Relays	Electronic	N/A	Refurbish / Replace	N/A	
			Auxiliary	Electro Mechanical	N/A	Inspect	N/A	
				Electronic	N/A	Refurbish / Replace	N/A	
CSC	Seal	Passive	N/	Ά΄	Replace	Inspect	N/A	
SOL	Solenoid	Active	N/	N/A		Inspect	N/A	
SLV, IFSV, LSV, FSV, PSV	Solenoid Valve	Active	N/	N/A		blace	N/A	
			Subject To Submergence	N/A	Replace	Replace	N/A	
SPLC	Splice	Passive	Not Subject to Submergence	N/A	Replace	Inspect	N/A	
BUS, BD	Switch Gear Primary Bus	Passive	. N/	A	N/A	In-service	N/A	
	Switchgear, Distribution (compartment)	Active	N/	A	N/A	Inspect / Refurbish	N/A	
TBLK, TB	Terminal Block	Active	N/	A	Inspect / Replace / Verify QL	Inspect	N/A	

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Electrical									
FUNCTION	CATEGORY	ACTIVE /	SUB	SUB SUB	ACTI	ACTION REQUIRED			
		PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ		
				MCC Control	N/A	Replace	N/A		
				Control (Potential)	Inspect / Replace	Inspect / Replace	N/A		
			Dry	Control (Current)	Inspect / Replace	Inspect / Replace	N/A		
XFMR, XFA, CTR, DFX	Transformer	Active		Large Power	N/A	Inspect	N/A		
			Oil Filled	Large Power	N/A	Inspect	N/A		
INV, UPX	UPS (Inverter)	Active	N/	A .	N/A	In-service /(New for U2 Vital)	N/A		

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Instruments and Control									
FUNCTION	CATEGORY	ACTIVE /	SUB SUB SUB	ACTIO	ON REQUI	RED			
		PASSIVE	DESCRIPTIONDESCRIPTION	EQ	SR/QR	MEQ			
ADC, AMP, ANN, CLK, CM, CMPT, CNT, CPU, DAC, DDC, DFP, DLH, EAI, EAO, ECO, EM, EPI, ERI, FM, FQ, H2A, H2AN,			Eagle 21, SSPS, PAM (Common Q), Spec 200 (AFW, EGTS, Misc), SRMs/IRMs, Process Instr (Foxboro I/A), Loose Parts, Radiation Monitors, Incore Probes (WINCISE), RPI (CERPI), Annunciators, Process Computer, Hydrogen Analyzer	New / Replace	New / Replace	N/A			
H2E, H2M, HDAC, IDWR, IIQ,IMOD, INM, INS, ITM, LCP, RA, RE, RI, CMPT, H2AN, H2E, IJY, IMOD, INY, ISY, ITY, IUY, IXQ, LM, LNSW, MON, MUX, NM, PM, RM, SM, TM, UY, VE, VM, XM, PDM	Circuit Card / Electronic Module	Active	Power Range Nuclear Instrumentation, Valve Monitor, AFW Turbine Speed Controller, AEH	N/A	Refurbish	N/A			
	Condensing Pot	Passive	N/A	N/A	Inspect	N/A			
CIC. CNTL			Electronic	N/A	Replace	N/A			
EC, E/TI, FC, ERC, FIC, F/LC, H2C, HC, HIC, HYC, IC, IEC, IFC, INC, ISC, ISOL, ITC, LC,LIC, PC, PDC, PDIC, PHC, PIC, PMC, SC, SEC, SIC, TC, TIC, XIC, XC	Controller	Active	Pneumatic	N/A	Replace / Refurbish	N/A			
FOC, FOP	Fiber Optic Component	Active	N/A	N/A	New	N/A			
DIEG	Diesel Generator	Actíve	N/A	N/A	In-service	N/A			

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	Instruments and Control												
FUNCTION CATEGORY ACTIVE / SUB SUB SUB ACTION PASSIVE DESCRIPTION DESCRIPTION FOLDS													
	••••=•••••	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ						
CI, EI, E/TI, FI, FMT, H2I, IEI, IFI, II, INI, IPDI,			Electro Mechanical	N/A	N/A	Inspect / Replace	N/A						
IPI, ISI, ITI,	Indicator	Active	Electronic	N/A	N/A	Replace	N/A						
IXDI, IXI, LI, LIS, NI, PDI, PI, RI, SI, TI, VI, WHM, XI, ZI			Mechanical	N/A	N/A	Inspect / Replace	N/A						
IPX, IXX, PX, XX	Power Supply	Active	N	/A	N/A	Refurbish / Replace	N/A						
RI, RIS, RIT, RM, RMI, RMS	Radiation Monitor	Active	N	/Α	Replace	Replace	N/A						
CR, FR, H2ZR, HYR, HZR, INR, ITR, IUDR, IXR, IZR, LR, MR, NAR, NR, O2R, P/TR, PDIR, PDR, PHR, REC, RR, SIR, TR, VTR, XR, UDR, VR	Recorder	Active	N	N/A	Replace	N/A							
	Sample	Activo	Misc	N/A	N/A	Refurbish /Replace	N/A						
VENE	Pump	Active	Radiation Monitor	N/A	N/A	Replace	N/A						
DET	Sensors (Bellows, Diaphrams)	Active	N	/Α	N/A	Refurbish /Replace	N/A						
FDS, FIS, FS, H2IS, H2S,			Electro Mechanical	N/A	Replace	Refurbish / Replace	N/A						
IFS, IFIS, IJB, IJS ILS, INS, IPDS, IPIS, IPS, IS, ISB, IT, ITIS, ITS, LIS, LS, ILIS, ILS, PS, PIS, TS, TIS, PDS, PDIS, SS	Instrument Switch	nt Passive Electronic		N/A	Replace	Replace / Refurbish	N/A						
IZS, LSW, ZS	Limit Switch	Active	N	/Α	Replace	Refurbish /Replace	N/A						

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Instruments and Control											
FUNCTION	CATEGORY	ACTIVE /	SUB	ACTIC	ACTION REQUIRED						
TUNCTION	CALGORI	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ				
CT, FIT, FT, H2IT, H2T, IFIT, ITT, LT, PDIT, PDT, PIT, PT, TD, TT, VT, XIT, XMTR, XT	Transmitter	Active	Ν	/A	Replace	Replace	N/A				
AIRL	Instrument Air Tubing	Passive	N	/Α	N/A	Inspect	N/A				
RADL, SENL, TBG, TUBE	Instrument Sensing Line	Passive	N	N/A	Inspect	N/A					
ITE, TE	Temp. Element	Active	TC	N/A N/A	New N/A	Inspect Inspect	N/A N/A				

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Mechanical											
		ACTIVE /	SUB	SUB SUB	AC	TION REQU	RED				
FUNCTION	CATEGORY	PASSIVE	DESCRIP TION	DESCRIPTIO N	EQ	SR/QR	MEQ				
AHU, BLOW, EXH, FAN, VEXT	Fan	Active	N/A	N/A	N/A	Refurbish	Refurbish				
			Dry	N/A	N/A	Inspect	N/A				
GLCL, PMCL	Cooling Coil	Passive	Wet	N/A	N/A	Inspect	N/A				
CHR, ACU	Chiller	Active	N/A	N/A	N/A	Refurbish	N/A				
COAT, CTNG	Coating (Protective)	Passive	N/A	N/A ⁺	N/A	Inspection	N/A				
COMP, DRYG	Compressor	Active	N/A	N/A	N/A	In-service	N/A				
CRDM, ROD	Control Rod Drive Mechanism	Active	N/A	N/A	N/A	Inspect / Test	N/A				
BKD, BLD, DMP, ISD	Damper	Active	N/A	N/A	N/A	Refurbish	Refurbish				
DUCT	Duct	Passive	N/A	N/A	N/A	Inspect	N/A				
ACUM, ADH, DEMN, DISC, DRN,			Dry	N/A	N/A	Inspect	N/A				
DRP,FLG, HOS, ITW, PIPE, PPD, SPPC, TRAP, TW	Pipe	Passive	Wetted	N/A	N/A	Inspect	N/A				
OR	Orifice	Passive	N/A	N/A	N/A	Inspect	N/A				
FLT, FLTR	Filter	Passive	N/A	N/A	N/A	Replace	N/A				
GR	Gear Box	Active	N/A	N/A	N/A	Refurbish	Refurbish				
COND HEX	Heat		Dry	N/A	N/A	Inspect	N/A				
SGEN	Exchanger	Passive	Wetted	N/A	N/A	Inspect	N/A				

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	Mechanical										
		ACTIVE /	SUB	SUB SUB	AC	TION REQU	JIRED				
FUNCTION	TION CATEGORY PASSIVE DESCRIPTIO		DESCRIPTION	EQ	SR/QR	MEQ					
MVOP, PCO,			Motor	N/A	Replace	Replace	N/A				
PDCO, FCO,	Valve Operator	Active	Air	N/A	N/A	Refurbish	Refurbish				
POS			Hydraulic	N/A	N/A	Refurbish	Refurbish				
PREG, BST	Pressure Regulator	Active	N/A	N/A	N/A	Refurbish / Replace	Refurbish / Replace				
CTP, SEAL	Seal	Passive	N/A	N/A	Inspect	Inspect / Replace	N/A				
TANK, TNK	Tank	Passive	Stainless	N/A	N/A	Inspect	N/A				
			Coated	N/A	N/A	Inspect	N/A				
BYIV, BYV, CKV, DRIV, DRV, EQIV, EQV, EXPV, FCV, FLV, HCV, HV, IBD, IBV, IDV, IFCV, INJ, ISIV, ISV, LCV, LOV,	Valve	Active	Unisolatal Fluid, High Tempera	ole, Radioactive Pressure, High ture (High risk)	N/A	Refurbish	Refurbish				
PCV, PDCV, PFV, RCKV, RCV, RFV, RTV, SFV, SMV, SPV, TCV, THV, TTIV, TTV, TV, VBRV, VLV, VTIV, VTV, XDV			Others Valves (Low risk)	N/A	N/A	Inspect / Refurbish	Inspect / Refurbish				
PMP, VPMP	Pump	Active	N/A	N/A	N/A	Refurbish	Refurbish				
TURB	Turbine	Active	N/A	N/A	N/A	Refurbish	Refurbish				

Attachment 3 (Page 1 of 12) Inspection Matrix

	Civil										
CATEGORY /	ACTIVE /	SUB	SUB SUB	AC	TION REQU	JIRED	PRESERVICE	PRESERVICE			
PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	MECHANISM			
		Structural Steel	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)			
		Welds	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)			
	Passive	Anchor Bolts	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage or corrosion			
		Concrete	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage (spalling or cracking)			
Supports (CAP)		Grout	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage (spalling or missing)			
· .		Unistrut	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)			
			Base Plate	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)		
		Manufactured component (i.e. Springs, pipe clamps, struts, spring cans)	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)			

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Civil										
CATEGORY /	ACTIVE /	SUB	SUB SUB	AC		JIRED	PRESERVICE	PRESERVICE		
PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	MECHANISM		
		Platforms	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)		
		Building Steel	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)		
Structural Steel (Eng Report)	Passive	Miscellaneous Steel	N/A ·	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)		
		Welds	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Arc Strikes, Corrosion (pitting, rust)		
		Bolting	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage, corrosion		
		Floor Slabs	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling		
	-	Walls	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling		
Concrete (CAP)	· Passive	Concrete Structures	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling		
		Pads	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage or water damage due to freeze thaw cycle, spalling		
	-	Rebar	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical Damage, Corrosion, Concrete Spalling		
		-	Fo	Foundations	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage or water damage due to freeze thaw cycle, spalling

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Civil										
CATEGORY /	ACTIVE /	SUB	SUB SUB	AC	TION REQU	JIRED	PRESERVICE	PRESERVICE		
PROCESS	PASSIVE	DESCRIPTION		EQ	SR/QR	MEQ	INSPECTION	MECHANISM		
Doors (Ice		Ice Cond. lower	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Physical damage, Corroded		
		Doors			- • •		2) Seal Inspection	2) Physical damage, Organic material aging.		
Condenser) (Ref 4.0F)	Active	Ice Cond.					1) Visual Inspection	1) Physical damage, Corroded		
		Intermediate Doors	N/A	N/A	Inspect	N/A	2) Seal Inspection	2) Physical damage, Organic material aging.		
		Doors (manual opening)	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Damaged, Corroded.		
Doors & Hatches	Active	Doors (Solenoid Operated, Motor Operated)	N/A	N/A	Inspect	N/A	1) Visual Inspection & Testing	1) Damaged, corroded.		
(Ref 4.0F)		Hatches	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Damaged Corroded		
		Blowout Panels	N/A	N/A	Inspect	N/A	1) Visual Inspection	1) Damaged Corroded		
		Blowout Door Seals	N/A	N/A	Inspect	N/A	1) Visual Inspection 2) Hardness inspection	1) Physical Damage 2) Organic material aging		
Seals		Divider Bearer Seals	N/A	N/A	Inspect	N/A	1) Visual Inspection 2) Hardness inspection	1) Physical Damage 2) Organic material aging		
(Eng Report)	Passive	Expansion Joints	N/A	N/A	Inspect	N/A	1) Visual Inspection 2) Hardness	1) Physical Damage 2) Organic		
		Door Seals	N/A	N/A	Inspect	N/A	Inspection 1) Visual Inspection 2) Hardness inspection	material aging 1) Physical Damage 2) Organic material aging		
Basket (Ice) (Ref 4.0F)	Passive	N/A	N/A	N/A	Inspect	N/A	1) Inspect for physical damage	1) Physical damage		

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Electrical											
CATEGORY /	ACTIVE /	SUB	SUB SUB	ACTI	ON REQU	RED	PRESERVICE	PRESERVICE			
PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	MECHANISM			
	Pacsivo	Cable (Medium	Above Ground	Inspect,	Inspect		1) Adjust qualified life (For EQ)	1) Organic material aging			
	F 4551VE	Voltage)	Above Ground	QL			2) Inspect for physical damage.	2) Physical damage.			
	Passive \	Cable (Low	N/A	Inspect,	Inspect	ect N/A	1) Adjust qualified life (For EQ)	1) Organic material aging			
Cable (CAP)		and Power)		QL			2) Inspect for physical damage.	2) Physical damage.			
	Passive	sive Cable (Shielded Instrument)	N/A	Inspect,	Inspect	NI/A	1) Adjust qualified life (For EQ)	1) Organic material aging			
				QL	mapeor		2) Inspect for physical damage.	2) Physical damage.			
	Passivo	Cable	N/A	Poplace	Increat		1) Adjust qualified life (For EQ)	1) Organic material aging			
	Fassive	(Multi Axial)	· N/A	Replace	mspect	N/A	2) Inspect for physical damage.	2) Physical damage.			
Blocking Diode (Relaying) (Ref 4.0F)	Active	Diode	N/A	N/A	Inspect	N/A	1) Inspect for physical damage	1) Physical damage			
Disconnect (Ref 4.0F)	Passive	N/	A	N/A	Inspect	N/À	1) Inspect for physical damage.	1) Physical damage			

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			Ele	ectrical				
CATEGORY /		SUD		ACTIO	ON REQU	IRED		PRESERVICE
TRACKING PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	ON MECHANISM
			· · ·				1) Inspect for physical damage, block looseness.	1) Physical damage
Hand Switch	Active	N		Inspect / Replace /	Inspect /	ΝΙ/Δ	2) Actuate switch to remove contact corrosion.	2) Contact Corrosion
(Ref 4.0F)	Active		Verify QL	Replace		3) Verify qualified life for EQ Switches.	3) Organic material aging.	
							4) Functionally test	4) Physical internal damage
Heater (Ref 4.0F)	Active	N	/A	N/A	Inspect	N/A	1) Inspect for physical damage, broken insulators, element, insulation/ corrosion.	1) Physical damage.
							1) Physical damage. 2) Inspect for external corrosion.	1) Physical Damage 2) Corrosion
							3) Perform internal inspection for corrosion	3) Moisture Corrosion.
Penetration (Electrical) (Ref 4.0F)	Passive	. N∕	Ά	Inspectio QL / R	n / Verify eplace	N/A	 Evaluate qualified life. Perform dielectric test. 	4) Organic material aging. 5) Physical damage. Moisture. Corrosion.
							6) OEM Recommendations	
							7) Leak Test	7) Physical damage. Organic material aging.
Relay (Ref 4.0F)	Active	Auxiliary	Electro Mechanical	N/A	Inspect	N/A	1) Physical damage 2) Test Contact corrosion	1) Physical damage 2) Physical damage

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Electrical									
CATEGORY /	ACTIVE /	SUB	SUB SUB	ΑСΤΙΟ	N REQUI	RED	PRESERVICE	PRESERVICE	
PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	MECHANISM	
Solenoid	A - 1:	N		N1/A	1	N/A	1) Inspect for physical damage.	1) Physical damage	
(Ref 4.0F)	Active	IN.	·Α	IN/A	inspect		2) Perform OEM recommendations.	2) Lubrication of mechanism, linkages.	
Splice (Ref 4.0F, Eng Report)	Passive	Not Subject to Submergence	N/A	Replace	Inspect	⁻ N/A	Inspect for physical damage.	Physical damage.	
					Inspect /		1) Inspect bus stabs for physical damage.	1) Physical damage.	
Switchgear, Distribution	Active						2} Perform micro ohm test from bus to stabs.	2) Connection creep. Fastener cracking.	
Distribution (compartments) (Ref 4.0F)		N/A		N/A	Refurbish	N/A	3) Compartment switches, linkages, contacts, etc. are refurbished per manufacturers instructions / procedures.	N/A	
Terminal Block (Ref 4.0F)	Active	N	Ά	Inspect / Replace / Verify QL	Inspect	N/A	 Inspect for physical damage. Verify qualified life 	1) Physical damage. Corrosion. 2) Aging of organic material	

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Electrical										
CATEGORY /	ACTIVE /	SUB	SUB SUB	ΑΟΤΙΟ	N REQUI	RED	PRESERVICE	PRESERVICE		
PROCESS	PASSIVE	DESCRIPTION	DESCRIPTION	EQ	SR/QR	MEQ	INSPECTION	MECHANISM		
			Control (Potential)	Inspect / Replace	Inspect / Replace	N/A	1) Inspect for physical damage.	1) Physical damage.		
	er Active	Dry	Control (Current)	Inspect / Replace	Inspect / Replace	N/A				
						1) Inspect for physical damage	1) Inspect for physical damage.	1) Physical damage.		
Transformer (Ref 4.0F)			Large Power	N/A	Inspect / Test	N/A	2) Perform dielectric, bridge, etc. testing.	2) Winding integrity.		
							1) Inspect for physical damage.	1) Physical damage.		
		Oil Filled	Large Power	N/A	Inspect / Test	N/A	2) Perform dielectric, bridge, etc. testing.	2) Aging of organic material. Moisture.		
							3) Oil testing before and after energization soak.	3) Aging of organic material. Moisture.		

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Instruments and Control								
CATEGORY				ACTIC	N REQUI	RED		PRESERVICE
/ TRACKING PROCESS	ACTIVE / PASSIVE	SUB DESCRIPTION	SUB SUB DESCRIPTION	EQ	SR/QR	MEQ	PRESERVICE INSPECTION	DEGRADATION MECHANISM.
Condensing Pot	Passive		Ά	N/A	Inspect	N/A	1) Inspect for physical damage and presents of foreign material on external.	1) Physical damage
(CAP)							2) Perform random swipes to verify no chemical contamination.	2) Chemical contamination.
	Active		Electro N/A echanical	N/A	Inspect / Replace	- -	1) Inspect for physical damage, bent needles, damaged case, other.	1) Physical damage.
		Electro Mechanical				N/A	2) Perform calibration including hysteresis check.	2) Damaged linkages, open coils, damaged bearings, corrosion on mechanical parts.
							3) OEM recommendations.	 If applicable - lubrication, etc.
Indicator (Ref 4.0F)		Active Mechan	Active				1) Inspect for physical damage, bent needles, damaged case, loss of fill fluid, loss of dampening fluid.	1) Physical damage.
			Mechanical	N/A	N/A	Inspect / Replace	N/A	2) Perform calibration including hysteresis check. (If indication is a QA function)
							3) OEM recommendations.	 If applicable - lubrication, etc.

CRF	Watts Bar Unit 2 Completion Project	25402-000-GPP-0000-TI216
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Instruments and Control									
CATEGORY				ACTIC	N REQUI	RED		PRESERVICE	
/ TRACKING PROCESS	ACTIVE / PASSIVE	SUB DESCRIPTION	SUB SUB DESCRIPTION	EQ	SR/QR	MEQ	PRESERVICE	DEGRADATION MECHANISM.	
Instrument							1) Inspect for physical damage and presents of foreign material on external.	1) Physical damage	
Air Tubing (Eng Report)	Passive	N/A		N/A	Inspect	N/A	2) Perform swipes to verify no chemical contamination.	2) Chemical contamination.	
Instrument Sensing	Passive	Passive N/A	Ά	N/A	Inspect	N/A	1) Inspect for physical damage and presents of foreign material on external.	1) Physical damage	
(CAP)							2) Perform swipes to verify no chemical contamination.	2) Chemical contamination.	
Temp.	Activo	RTD	N/A	New	Inspect	N/A	1) Inspect element. For physical damage and fit up.	1) Physical damage, corrosion and proper installation.	
(Ref 4.0F)	Active	тс	N/A	N/A	Inspect	N/A	1) Inspect element. For physical damage and fit up.	1) Physical damage, corrosion and proper installation.	

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Mechanical									
CATEGORY /	ACTIVE /	SUB	SUB SUB	ACT	ION REQU	IRED	PRESERVICE	PRESERVICE	
TRACKING PROCESS	PASSIVE	DESCRIPTION	DESCRIPTIO N	EQ	SR/QR	MEQ	INSPECTION	MECHANISM.	
		Dry	N/A	N/A	Inspect	N/A	1) Inspect for external physical damage.	1) Physical damage. Corrosion.	
							2) Perform swipes if stainless.	2) Chemical contamination.	
Cooling Coil (Ref 4.0F)	Passive						1) Inspect for external physical damage.	1) Physical damage. Corrosion.	
		Wet	N/A	N/A	Inspect	N/A	2) Inspect for internal damage.	1) Physical damage. Corrosion.	
							 Perform swipes if stainless. 	2) Chemical contamination.	
Coating <u>(</u> Protective) (Eng Report)	Passive	N/A	N/A	N/A	Inspection	N/A	1) Visual inspection and pull testing.	1) Physical damage. Chipping, peeling, or blistering. Chemical attack.	
	Active		N/A	N/A	Inspect / N/A Test		1) Inspect for physical damage.	1) Physical damage.	
Control Rod Drive Mechanism (Ref 4.0F)		Active N/A				2) Testing of jacking mechanism and RPI sencing, including current signature.	2) Physical damage. Internal contamination and corrosion.		
							3) Chemical swipes of accessible areas.	3) Chemical attack.	
Duct				N/A			1) Perform inspection.	1) Physical damage. Corrosion.	
(CAP)	Passive	N/A	N/A		Inspect	N/A	2) Chemical swipes if stainless	2) Chemical contamination.	

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Mechanical								
CATEGORY /	ACTIVE /	SUB	SUB SUB	ACT	ION REQU	IRED	PRESERVICE	PRESERVICE
TRACKING PROCESS	PASSIVE	DESCRIPTION	DESCRIPTIO N	EQ	SR/QR	R MEQ	INSPECTION	MECHANISM.
							 Perform inspection. Chemical swipes if stainless. 	 Physical damage. Corrosion. Chemical contamination.
		Dry	N/A	N/A	Inspect	N/A	3) For piping external to the building, remove insulation and inspect for external corrosion.	3) Corrosion.
Pipe (Eng Report)	Passive						1) Open piping to inspect to determine extent of wetting and for cleaning.	1) Physical damage. Corrosion.
		Wetted	N/A	N/A	Inspect	N/A	2) Perform UT of the piping to determine wall thickness degradation	2) Physical damage. Corrosion.
							3) Perform chemical swipes of internal and external portions of pipe if stainless steel.	3) Chemical contamination.
	`	Dry	N/A	N/A	Inspect	N/A	1) Inspect for size / serial number and orientation.	N/A
Orifice (Ref 4.0F)	Passive						1) Inspect physical damage	1) Physical damage. Corrosion. MIC.
		Wetted	N/A	N/A	Inspect	N/A	 Inspect for size serial number and orientation. 	N/A

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Mechanical									
CATEGORY /	ACTIVE /	SUB	SUB SUB	ACT	ION REQU	IRED	PRESERVICE	PRESERVICE	
TRACKING PROCESS	PASSIVE	DESCRIPTION	DESCRIPTIO N	EQ	SR/QR	MEQ	INSPECTION	MECHANISM.	
		Dry	N/A	N/A	Inspect	N/A	1) Inspect for external physical damage.	1) Physical damage. Corrosion.	
							2) Perform swipes if stainless.	2) Chemical contamination.	
Heat Exchanger (Ref 4.0F)	Passive				Inspect	pect N/A	1) Inspect for external physical damage.	1) Physical damage. Corrosion.	
		Wetted	N/A	N/A			 Inspect for internal damage. 	2) Physical damage. Corrosion.	
							 Perform swipes if stainless. 	3) Chemical contamination.	
Seal (Eng Report)	Passive	N/A	N/A	Inspect	Inspect / Replace	N/A	1) Inspect for physical damage.	1) Physical damage.	
			Stainless	N/A	N/A	Inspect	N/A	1) Inspect for physical damage, corrosion and chemical attack.	1) Physical damage. Chemical attack.
Tank (Ref 4.0F)	Passive						2) Perform chemical swipes.	2) Chemical attack.	
		Coated	N/A	N/A	Inspect	N/A	1) Inspect for physical damage and corrosion. Pull tests.	1) Physical damage. Corrosion. Failed coating.	
							1) Physical damage	1) Physical damage, corrosion	
Valves (Ref 4.0F)	Active	Low Risk	N/A	N/A	Inspect	Inspect	2) Check for binding	2) Physical damage. Hardened organic components.	
							3) Leak check	3) Hardened packing and other organic components.	

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Function Code List

Function			
Code	Function Text	Keyword	Qualifier
ACU	AIR CONDITIONER UNIT	AIR CONDITIONER	UNIT
ACUM	ACCUMULATOR	ACCUMULATOR	NONE
ADC	CARD, ANALOG TO DIGITAL CONVERTER	COMPUTATION	ANAL TO DIGITAL
ADH	HEADER, AIR DISTRIBUTION	HEADER	AIR DISTRIBUTION
AHU	AIR HANDLING UNIT	AIR HANDLING UNI	BLOWER
AIRL	LINE, INSTRUMENT, CONTROL AIR	INSTRUMENT LINE	CONTROL AIR
AMP	AMPLIFIER	COMPUTATION	AMPLIFIER
ANN	ANNUNCIATOR	ANNUC/ALARM	NONE
ARB	BOARD, RELAY, AUXILIARY	ELECT. BOARD	RELAY, AUX
BAT	BATTERY	BATTERY	NONE
BD	SWITCHBOARD	SWITCHBOARD	NONE
BKD	DAMPER, BACKDRAFT	DAMPER	BACKDRAFT
BKR	BREAKER, CIRCUIT	CIRCUIT BREAKER	NONE
BLD	DAMPER, BALANCING	DAMPER	BALANCING
BLKT	BLANKET	BLANKET	NONE
BLOW	BLOWER	BLOWER	NONE
BRK	BRAKE	BRAKE	NONE
BSKT	BASKET	BASKET	NONE
BST	BOOSTER	BOOSTER	NONE
BUS	BUS, ELECTRICAL	BUS	NONE
BYIV	VALVE, BYPASS, INSTRUMENT	VALVE	INSTRU, BYPASS
BYV	VALVE, BYPASS/RECIRCULATING	VALVE	BYPASS/RECIRC
CAB	CABINET, DISTRIBUTION, POWER	CABINET	DISTRIBUTION
CABL	CABLE	CABLE	NONE
CCU	COOLING UNIT, COMPARTMENT	COOLING UNIT	COMPARTMENTT
CHGR	CHARGER, BATTERY	BATTERY CHARGER	NONE
CHR	CHILLER	CHILLER	NONE
CI	INDICATOR, CONDUCTIVITY	INDICATOR	CONDUCTIVITY
CIC	CONTROLLER, INDICATIING, CONDUCTIVITY	CONTROLLER	CONDUCTIV'Y IND
СКУ	VALVE, CHECK	VALVE	CHECK
CLK	CLOCK	COMPUTATION	CLOCK
CLR	COOLER	COOLER	NONE
СМ	MODIFIER, CONDUCTIVITY	COMPUTATION	CONDUCTIVITY
CMPT	COMPUTER EQUIPMENT	COMPUTER	EQUIPMENT
CNT	COUNTER	COMPUTATION	COUNTER
CNTL	CONTROLLER	CONTROLLER	NONE
CNTR	CONTACTOR, CIRCUIT BREAKER	CONTACTOR	CIRCUIT BREAKER
COAT	COATING, PROTECTIVE	COATING	PROTECTIVE
COIL	COIL	CÓIL	NONE

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Function			
Code	Function Text	Keyword	Qualifier
COMP	COMPRESSOR	COMPRESSOR	NONE
CON	CONDUIT	CONDUIT	NONE
COND	CONDENSER	CONDENSER	NONE
CPU	COMPUTER	COMPUTER	CPU
CR	RECORDER, CONDUCTIVITY	RECORDER	CONDUCTIVITY
CRDM	DRIVE MECHANISM, CONTROL ROD	DRIVE MECHANISM	CONTROL ROD
CRN	CRANE	CRANE	NONE
CSC	CONNECTOR, CONDUIT SEAL	CONNECTOR	CONDUIT SEAL
CT	TRANSMITTER, CONDUCTIVITY	TRANSMITTER	CONDUCTIVITY
CTNG	COATING, PROTECTIVE	COATING	PROTECTIVE
CTP	PENETRATION, CABLE TRAY	PENETRATION	CABLÉ TRAY
CTR	TRANSFORMER, CURRENT	TRANSFORMER	CURRENT
CTSP	SUPPORT, CABLE TRAY	SUPPORT	CABLE TRAY
DAC	DIGITAL TO ANALOG CONVERTER	CONVERTER	DIG TO ANAL CONV
DDC	DIGITAL TO DIGITAL CONVERTER	CONVERTER	DIGITAL TO DIGIT
DEMN	DEMINERALIZER	DEMINERALIZER	NONE
DFP	DIGITAL FILTER PROCESSOR	COMPUTATION	DIGITAL FILTER
DFX	TRANSFORMER, MULTI-TAP	TRANSFORMER	MULTI-TAP
DGP	PANEL, DOOR AND GATE	PANEL	DOOR AND GATE
DIEG	ENGINE, DIESEL	ENGINE	DIESEL
DIO	DIODE, ELECTRICAL	DIODE	NONE
DISC	DISC, RUPTURE	RUPTURE DISC	NONE
DLH	DATA LINK HANDLER	COMPUTATION	DATA LINK HANDLE
DMP	DAMPER	DAMPER	NONE
DOOR	DOOR	DOOR	NONE
DPL	PANEL, DISTRIBUTION	PANEL	DISTRIBUTION
DRIV	VALVE, DRAIN, INSTRUMENT	VALVE	DRAIN, INSTRUMENT
DRN	DRAIN, FLOOR	DRAIN	FLOOR
DRV	VALVE, DRAIN	VALVE	DRAIN
DRYG	DRYER, GAS	DRYER	GAS
DSL	DOOR, SOLENOID OPERATED	DOOR	SOLENOID OPER'D
DUCT	DUCT	DUCT	NONE
DXF	TRANSFORMER, DRY-TYPE	TRANSFORMER	DRY TYPE
E/TI	INDICATOR, ELECTRICAL AND TEMPERATURE	INDICATOR	ELECT/TEMP
EAI	EAGLE ANALOG INPUT	ANALOG INPUT	EAGLE
EAO	EAGLE ANALOG OUTPUT	ANALOG OUTPUT	EAGLE
EC	CONTROLLER, ELECTRICAL	CONTROLLER	ELECTRICAL
ECO	EAGLE CONTACT OUTPUT	CONTACT OUTPUT	EAGLE

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Function			
Code	Function Text	Keyword	Qualifier
ECON	CONNECTOR, ELECTRICAL	CONNECTOR	ELECTRICAL
EI	INDICATOR, ELECTRICAL	INDICATOR	ELECTRICAL
EIS	SWITCH, INDICATING, ELECTRICAL	SWITCH	INDICATING
EM	MODIFIER, ELECTRICAL	COMPUTATION	MODIFIER
EPT	EAGLE PARTIAL TRIP	PARTIAL TRIP	EAGLE
EQH	HATCH, EQUIPMENT	HATCH	EQUIPMENT
EQIV	VALVE, EQUALIZING INSTRUMENT	VALVE	INST. EQUALIZING
EQSP	SUPPORT, EQUIPMENT	SUPPORT	EQUIPMENT
EQV	VALVE, EQUALIZING	VALVE	IEQUALIZING
ERI	EAGLE RTD INPUT	RTD INPUT	EAGLE
ES	SWITCH, ELECTRICAL	SWITCH	ELECTRICAL
EXC	EXCITER	GENERATOR	EXCITER
EXH	EXHAUSTER	EXHAUSTER	NONE
EXPJ	JOINT, EXPANSION	JOINT	EXPANSION
EXPV	VALVE, EXPANSION	VALVE	EXPANSION
FAN	FAN	FAN	NONE
FC	CONTROLLER, FLOW	CONTROLLER	FLOW
FCO	VALVE OPERATOR, FLOW CONTROL	VALVE OPERATOR	FLOW CONTROL
FCV	VALVE, CONTROL, FLOW	VALVE	FLOW CONTROL
FDS	SWITCH, DIFFERENTIAL, FLOW	SWITCH	FLOW, DIFFERENTIAL
FE	ELEMENT, FLOW	ELEMENT	FLOW
FI	INDICATOR, FLOW	INDICATOR	FLOW
FIC	CONTROLLER, INDICATING, FLOW	CONTROLLER	FLOW INDICATING
FIS	SWITCH, INDICATING, FLOW	SWITCH	FLOW INDICATING
FIT	TRANSMITTER, INDICATING, FLOW	TRANSMITTER	FLOW INDICATING
FLG	FLANGE, PIPE, PRESSURE	FLANGE	PIPE
FLT	FILTER	FILTER	NONE
FLTR	FILTER	FILTER	NONE
FLV	VALVE, FLUSH	VALVE	FLUSH
FM	MODIFIER, FLOW	COMPUTATION	FLOW
FMT	FLOWMETER	FLOWMETER	NONE
FOC	CONVERTER, FIBER OPTIC	CONVERTER	FIBER OPTIC
FOP	FIBER OPTIC PANEL	PANEL	FIBER OPTIC
FQ	TOTALIZER, FLOW	COMPUTATION	FLOW TOTALIZER
FR	RECORDER, FLOW	RECORDER	FLOW
FS	SWITCH, FLOW	SWITCH	FLOW
FSV	VALVE, SOLENOID, FLOW	VALVE	FLOW, SOLENOID
FT	TRANSMITTER, FLOW	TRANSMITTER	FLOW
FU	FUSE ELECTRICAL	FUSE	NONE

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Function			
Code		Keyword	Qualifier
FUDS	SWITCH, DISCONNECT, FUSIBLE	SWITCH	DISCON, FUSIBLE
GEN	GENERATOR	GENERATOR	NUNE
GLCL			GLYCOL, FLOOR
GR	GEARBOX	GEARBOX	NONE
H2AN	ANALYZER, HYDROGEN	ANALYZER	HYDROGEN
H2C	CONTROLLER, HYDROGEN		HYDROGEN
H2E	ELEMENT, HYDROGEN	ELEMENT	HYDROGEN
H2I	INDICATOR, HYDROGEN	INDICATOR	HYDROGEN
H2IS	SWITCH, INDICATING, HYDROGEN	SWITCH	INDICATING, H2
H2IT	TRANSMITTER, INDICATING, HYDROGEN	TRANSMITTER	INDICATING, H2
H2M	MODIFIER, HYDROGEN	COMPUTATION	HYDROGEN
H2S	SWITCH, HYDROGEN	SWITCH	HYDROGEN
H2T	TRANSMITTER, HYDROGEN	TRANSMITTER	HYDROGEN
H27R	RECORDER CONDUCTIVITY CATION	RECORDER	CATION CONDUCTIVITY
HC	CONTROLLER HAND		HAND
HCV			HAND CONTROL
HDAC	CONVERTER	CONVERTER	DIG-ANAL HI PREC
HGR	HANGER, PIPE	HANGER	PIPE
HIC	CONTROLLER, INDICATING, HAND	CONTROLLER	HAND INDICATING
HOSE	HOSE	HOSE	NONE
HS	SWITCH, HAND	SWITCH	HAND
HTR	HEATER	HEATER	NONE
HTX	HEAT EXHANGER	HEAT EXCHANGER	NONE
HYC	CONTROLLER, HYDRAZINE	CONTROLLER	HYDRAZINE
HYR	RECORDER, HYDRAZINE	RECORDER	HYDRAZINE
HZR	RECORDER, CONDUCTIVITY, CATION	RECORDER	CATION CONDUCTIVITY
IBD	VALVE, ISOLATION, BYPASS DRAIN	VALVE	ISO BYPASS DRAIN
IBV	VALVE, ISOLATION, BYPASS	VALVE	ISO BYPASS
IC	CONTROLLER, INTERVAL (TIME)	CONTROLLER	INTERVAL
IDV	VALVE, ISOLATION, DRAIN	VALVE	DRAIN
IEC	REGULATOR, VOLTAGE	CONTROLLER	VOLTAGE REGULATO
IEI		INDICATOR	ELECTRICAL
IFC	CONTROLLER, FLOW	CONTROLLER	FLOW
IFCV	VALVE, CONTROL, FLOW	VALVE	FLOW CONTROL
IFI	INDICATOR, FLOW	INDICATOR	FLOW
IFIT	TRANSMITTER, INDICATING, FLOW	TRANSMITTER	FLOW INDICATING

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Function	· · · · · · · · · · · · · · · · · · ·		
Code	Function Text	Keyword	Qualifier
IFS	SWITCH, FLOW	SWITCH	FLOW
IFSV	VALVE, SOLENOID, FLOW	VALVE	FLOW SOLENOID
IHS	SWITCH, HAND	SWITCH	HAND
	INDICATOR, CURRENT	INDICATOR	CURRENT
IIQ	TOTALIZER, INTERVAL (TIME)	COMPUTATION	TOTALIZER, TIME
IJB	SWITCH, BYSTABLE, POWER	SWITCH	POWER, BYSTABLE
IJS	SWITCH, POWER	SWITCH	POWER
IJY	MODIFIER, POWER	COMPUTATION	POWER
ILS	SWITCH, LEVEL	SWITCH	LEVEL
IMOD	MODULE, INSTRUMENT	MODULE	INSTRUMENT
	CONTROLLER, DETECTOR	CONTROLLER	DETECTOR
INI	INDICATOR, NUCLEAR	INDICATOR	NUCLEAR
INJ	VALVE, INJECTOR	VALVE	INJECTOR
INM	MODIFIER, NUCLEAR	COMPUTATION	NUCLEAR
INR	RECORDER, NUCLEAR	RECORDER	NUCLEAR
INS	SWITCH, NUCLEAR	SWITCH	NUCLEAR
INV	INVERTER	INVERTER	NONE
INY	STATIC GAIN UNIT	COMPUTATION	STATIC GAIN
IPDI	INDICATOR, DIFFERENTIAL, PRESSURE	INDICATOR	
IPDS	SWITCH, DIFFERENTIAL, PRESSURE	SWITCH	DIFF PRESSURE
IPDT	TRANSMITTER, DIFFERENTIAL, PRESSURE	TRANSMITTER	DIFF PRESSURE
IPI	INDICATOR, PRESSURE	INDICATOR	PRESSURE
IPS	SWITCH, PRESSURE	SWITCH	PRESSURE
IPX	POWER SUPPLY	POWER SUPPLY	NONE
IS	SWITCH, INTERVAL (TIME)	SWITCH	INTERVAL
ISB	SWITCH, BYSTABLE, SPEED/FREQUENCY	SWITCH	BYSTAB SPD/FREQ
ISC	CONTROLLER, SPEED	CONTROLLER	SPEED
ISD	DAMPER, ISOLATION OR FIRE	DAMPER	ISO OR FIRE
ISI	INDICATOR, SPEED	INDICATOR	SPEED
ISIV	VALVE, ISOLATION INSTRUMENT	VALVE	INST ISOLATION
ISLV	SLEEVE	SLEEVE	NONE
ISOL	ISOLATOR	ISOLATION DEV	ISOLATOR
ISV	VALVE, ISOLATION	VALVE	ISOLATION
ISY	UNIT, STATIC GAIN	UNIT	STATIC GAIN
IT	TRANSMITTER, INTERVAL (TIME)	TRANSMITTER	INTERVAL
ITC	CONTROLLER, TEMPERATURE	CONTROLLER	TEMPERATURE
ITE	ELEMENT, TEMPERATURE	ELEMENT	TEMPERATURE
ITI	INDICATOR, TEMPERATURE	INDICATOR	TEMPERATURE
ITIS	SWITCH, INDICATING, TEMPERATURE	SWITCH	TEMP INDICATING

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Function			
Code	Function Text	Keyword	Qualifier
ITM	MODIFIER, TEMPERATURE	COMPUTATION	TEMPERATURE
ITR	RECORDER, TEMPERATURE	RECORDER	TEMPERATURE
ITS	SWITCH, TEMPERATURE	SWITCH	TEMPERATURE
ITT	TRANSMITTER, TEMPERATURE	TRANSMITTER	TEMPERATURE
ITW	WELL, TEMPERATURE	WELL	THERMOCOUPLE
ITY	MODIFIER, TEMPERATURE, AUCTIONEERED	COMPUTATION	TEMP, AUCTIONEER
IUDR	RECORDER, MULTIVARIABLE	RECORDER	MULTIVARIABLE
IUY	MODIFIER, MULTI-VARIABLE	COMPUTATION	MULTI-VARIABLE
· IXDI	INDICATOR, DIFFERENTIAL, SPECIAL	INDICATOR	DIFF SPECIAL
IXI	INDICATOR, SPECIAL	INDICATOR	SPECIAL
IXQ	TOTALIZER, SPECIAL	COMPUTATION	SPECIAL TOTALIZE
IXR	RECORDER, SPECIAL	RECORDER	SPECIAL
IXS	SWITCH, SPECIAL	SWITCH	SPECIAL
IXX	POWER, SUPPLY, SPECIAL	POWER SUPPLY	SPECIAL
IZR	RECORDER, ZONE (POSITION)	RECORDER	ZONE
IZS	SWITCH, ZONE (POSITION)	SWITCH	ZONE
JB	BOX, JUNCTION, TVA	BOX, JUNCTION	TVA
JBA	CONTROL UNIT, REMOTE	CONTROLLER	REMOTE
JBM	BOX, JUNCTION, MANUFACTURED	BOX, JUNCTION	MANUFACTURED
LAC	CABINET, LIGHTING, AC	CABINET	LIGHTING, AC
LAD	CABINET, LIGHTING, DC	CABINET	LIGHTING, DC
LC	CONTROLLER, LEVEL	CONTROLLER	LEVEL
LCP	LOOP CALCULATION PROCESSOR	COMPUTATION	LOOP PROCESSOR
LCV	VALVE, CONTROL, LEVEL	VALVE	LEVEL CONTROL
LDCL	LOAD CELL	LOAD CELL	NONE
LDVX	LIFTING DEVICE	LIFTING DEVICE	NONE
LI	INDICATOR, LEVEL	INDICATOR	LEVEL
LIC	CONTROLLER, INDICATING, LEVEL	CONTROLLER	LEVEL IND
LIS	SWITCH, INDICATING, LEVEL	SWITCH	LEVEL, IND
LM	MODIFIER, LEVEL	COMPUTATION	LEVEL
LNSW	LAN SWITCH	SWITCH	LAN
LOV	VALVE, LEAKOFF	VALVE	LEAKOFF
LR	RECORDER, LEVEL	RECORDER	LEVEL
LS	SWITCH, LEVEL	SWITCH	LEVEL
LSV	VALVE, SOLENOID, LEVEL	VALVE	LEVEL, SOLENOID
LSW	SWITCH, LIMIT	SWITCH	LIMIT
LT	TRANSMITTER, LEVEL	TRANSMITTER	LEVEL
MCC	CONTROL CENTER, MOTOR	CONTROL CENTER	MOTOR

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Function Code	Function Text	Keyword	Qualifier
мссс	COMPARTMENT, CONTROL CENTER, MOTOR	COMPARTMENT	мсс
MON	MONITOR	MONITOR	NONE
MR	RECORDER, MOISTURE	RECORDER	MOISTURE
MTR	MOTOR	MOTOR	NONE
MUX	MULTIPLEXER	MULTIPLEXER	NONE
MVOP	OPERATOR, VALVE, MOTOR	OPERATOR, VALVE	MVOP
NAR	RECORDER, SODIUM	RECORDER	SODIUM
NI	INDICATOR, NEUTRON	INDICATOR	NEUTRON
NM	MODIFIER, NEUTRON	COMPUTATION	NEUTRON
NR	RECORDER, NEUTRON	RECORDER	NEUTRON
O2A	ALARM, OXYGEN	ANNUC/ALARM	OXYGEN
O2AN	ANALYZER, OXYGEN	ANALYZER	OXYGEN
O2E	ELEMENT, OXYGEN	ELEMENT	OXYGEN
O2R	RECORDER, OXYGEN	RECORDER	OXYGEN
OR	ORIFICE	ORIFICE	PIPE
OXF	TRANSFORMER, OIL-FILLED	TRANSFORMER	OIL-FILLED
P/TR	RECORDER, PRESSURE AND TEMPERATURE	RECORDER	PRESS/TEMP
PC	CONTROLLER, PRESSURE	CONTROLLER	PRESSURE
	······································	· · · · · · · · · · · · · · · · · · ·	PRESSURE
PCO	VALVE OPERATOR, PRESSURE CONTROL	VALVE OPERATOR	CONTROL
PCV	VALVE, CONTROL, PRESSURE	VALVE	PRESS CONTROL
PDC	CONTROLLER, DIFFERENTIAL, PRESSURE	CONTROLLER	PRESSURE DIFF
PDCO	CONTROL OPERATOR, DIFFERENTIAL PRESSURE	CONTROL OPERATOR	PRESSURE DIFF
PDCV	VALVE, CONTROL, DIFFERENTIAL, PRESSURE	VALVE	CNTRL PRES DIFF
PDI	INDICATOR, DIFFERENTIAL, PRESSURE	INDICATOR	PRESSURE DIFF
PDIC	CONTROLLER, INDICATING, DIFFERENTIAL PRESSURE	CONTROLLER	PRESS DIFF IND
,	SWITCH, INDICATING, DIFFERENTIAL,	···· · · · · · · ·	
PDIS	PRESSURE	SWITCH	PRESS DIFF IND
	TRANSMITTER, INDICATING, DIFFERENTIAL,		
PDIT	PRESSURE	TRANSMITTER	PRESS DIFF IND
PDM	MODIFIER, DIFFERENTIAL, PRESSURE	COMPUTATION	PRESSURE DIFF
PDR	RECORDER, DIFFERENTIAL, PRESSURE	RECORDER	PRESSURE DIFF
PDS	SWITCH, DIFFERENTIAL, PRESSURE	SWITCH	PRESSURE DIFF
PDT	TRANSMITTER, DIFFERENTIAL, PRESSURE	TRANSMITTER	PRESSURE DIFF
PENT	PENETRATION	PENETRATION	NONE
PFV	VALVE, FLOW, PROCESS	VALVE	PROCESS, FLOW
PHC	CONTROLLER, PH	CONTROLLER	PH
PHR	RECORDER, PH	RECORDER	РН
PI I	INDICATOR. PRESSURE	INDICATOR	PRESSURE

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Function			
Code	Function Text	Keyword	Qualifier
PIC	CONTROLLER, INDICATING, PRESSURE	CONTROLLER	PRESS INDICATING
PIPE	PIPE	PIPE	NONE
PIS	SWITCH, INDICATING, PRESSURE	SWITCH	PRESS INDICATING
PIT	TRANSMITTER, INDICATING, PRESSURE	TRANSMITTER	PRESS INDICATING
PL	PLATE	PLATE	NONE
PM	MODIFIER, PRESSURE	COMPUTATION	PRESSURE
PMC	CONTROLLER, PROGRAMMABLE	CONTROLLER	PROGRAMMABLE
PMCL	COOLER, PUMP	COOLER	PUMP
PMP	PUMP	PUMP	NONE
POS	POSITIONER	POSITIONER	NONE
PS	SWITCH, PRESSURE	SWITCH	PRESSURE
PSP	SUPPORT, PIPE	SUPPORT	PIPE
PSV	VALVE, SOLENOID, PRESSURE	VALVE	PRESS, SOLENOID
PT	TRANSMITTER, PRESSURE	TRANSMITTER	PRESSURE
PX	POWER SUPPLY	POWER SUPPLY	NONE
RA	ALARM, RADIATION	ANNUC/ALARM	RADIATION
RADL	LINE, INSTRUMENT, RAD MONITORING	INSTRUMENT LINE	RAD MONITORING
RCKV	VALVE, RECIRCULATING, CHECK	VALVE	CHECK, RECIRC
			CONTROL
RCV	VALVE, CONTROL, RADIATION	VALVE	RADIATION
RE	ELEMENT, RADIATION	ELEMENT	RADIATION
REC	RECORDER	RECORDER	NONE
RES	RESISTOR, ELECTRICAL	RESISTER	NONE
RFV	VALVE, RELIEF	VALVE	RELIEF
RI	INDICATOR, RADIATION	INDICATOR	RADIATION
RLY	RELAY	RELAY	NONE
RM	MODIFIER, RADIATION	COMPUTATION	RADIATION
ROD	ROD, CONTROL	CONTROL ROD	NONE
RPV	VESSEL, REACTOR PRESSURE	VESSEL	REACTOR PRESS
RR	RECORDER, RADIATION	RECORDER	RADIATION
RTV	VALVE, ROOT	VALVE	ROOT
SC	CONTROLLER, SPEED	CONTROLLER	SPEED
SCO	OPERATOR, CONTROL, SPEED	OPERATOR	SPEED CONTROL
SCR	RECTIFIER, SILICON CONTROLLED	RECTIFIER	SCR
SEAL	SEAL	SEAL	NONE
SEC	CONTROLLER, SERIAL ETHERNET	CONTROLLER	SERIAL ETHERNET
SENL	LINE, SENSE, INSTRUMENT	INSTRUMENT LINE	SENSE
SFV	VALVE, SAFETY	VALVE	SAFETY
		STEAM	
SGEN	GENERATOR, STEAM	GENERATOR	NUCLEAR
SHKA	SHOCK ABSORBER	SUPPORT	SHOCK ABSORBER
SI	INDICATOR, SPEED	INDICATOR	SPEED
SIC	CONTROLLER, INDICATING, SPEED	CONTROLLER	SPEED INDICATING

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Function			
Code	Function Text	Keyword	Qualifier
SIR	RECORDER, SILICA	RECORDER	SILICA
SLV	SLEEVE	SLEEVE	NONE
SM	MODIFIER, SPEED	COMPUTATION	SPEED
SMV	VALVE, SAMPLE	VALVE	SAMPLE
SNUB	PIPE SUPPORT, SNUBBER	SUPPORT	PIPE, SNUBBER
SOL	SOLENOID	SOLENOID	NONE
SPPC	PIPE, SPOOL PIECE	PIPE	SPOOL PIECE
SPV	VALVE, SPECIAL	VALVE	SPECIAL
SS	SWITCH, SPEED	SWITCH	SPEED
STR	STARTER, MOTOR	STARTER	MOTOR
STRU	STRUCTURE	STRUCTURE	NONE
SUPP	SUPPORT, MISCELLANEOUS	SUPPORT	MISCELLANEOUS
SW	SWITCH, DISCONNECT	SWITCH	DISCONNECT
TANK	TANK	TANK .	NONE
ТВ	TERMINAL BLOCK (STRIP)	TERMINAL BLOCK	STRIP
TBG	TUBING	TUBING	NONE
TBLK	BLOCK, TERMINAL (STRIP)	TERMINAL BLOCK	STRIP
TC	CONTROLLER, TEMPERATURE	CONTROLLER	TEMPERATURE
	CONTROL OPERATOR, TEMPERATURE	CONCROL	
тсо	(DAMPER)	OPERATOR	TEMP (DAMPER)
TCV	VALVE, CONTROL, TEMPERATURE	VALVE	TEMP CONTROL
TD	TRANSDUCER	TRANSDUCER	NONE
TE	ELEMENT, TEMPERATURE	ELEMENT	TEMPERATURE
THV	VALVE, THROTTLING	VALVE	THROTTLING
TI	INDICATOR, TEMPERATURE	INDICATOR	TEMPERATURE
TIC	CONTROLLER, INDICATING, TEMPERATURE	CONTROLLER	TEMP/INDICATING
TIS	SWITCH, INDICATING, TEMPERATURE	SWITCH	TEMP/INDICATING
TM		COMPUTATION	TEMPERATURE
TMR		SWITCH	
TNK			NONE
TR		RECORDER	TEMPERATURE
TRAP		TRAP	NONE
TS		SWITCH	TEMPERATURE
TSV	VALVE, SOLENOID, TEMPERATURE	VALVE	TEMP SOLENOID
TT	TRANSMITTER, TEMPERATURE	TRANSMITTER	TEMPERATURE
TTIV	VALVE, TELLTALE, INSTRUMENT	VALVE	TELLTALE,INST
TTV		VALVE	TELLTALE
TUBE		TUBE	NONE
TURB		TURBINE	NONE
TV	VALVE, TEST	VALVE	TEST
TW	WELL, TEMPERATURE	WELL	THERMOCOUPLE
UDR	RECORDER, TREND	RECORDER	TREND
UPX	POWER SUPPLY, UNINTERRUPTIBLE	POWER SUPPLY	UNINTERRUPTIBLE

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Function			
Code	Function Text	Keyword	Qualifier
UY	MODIFIER, MULTI-VARIABLE	COMPUTATION	MULTI-VARIABLE
VBRV	VALVE, VACUUM BREAK	VALVE	VACUUM BREAK
VE	ELEMENT, VIBRATION	ELEMENT	VIBRATION
VEXT	EXTRACTOR, VAPOR	VAPOR EXTRACTOR	NONE
i VI	INDICATOR, VIBRATION	INDICATOR	VIBRATION
VLV	VALVE	VALVE	NONE
VM	MODIFIER, VIBRATION	COMPUTATION	VIBRATION
VPMP	PUMP, VACUUM	PUMP	VACUUM
VR	RECORDER, VIBRATION	RECORDER	VIBRATION
VT	TRANSMITTER, VIBRATION	TRANSMITTER	VIBRATION
VTIV	VALVE, VENT, INSTRUMENT	VALVE	VENT, INSTRUM'NT
VTR	RECORDER, TAPE, VIDEO	RECORDER	VIDEO TAPE
VTV	VALVE, VENT	VALVE	VENT
WELD	WELD	WELD	NONE
WHM	METER, WATTHOUR	INDICATOR	WATTHOUR
XC	CONTROLLER, SPECIAL	CONTROLLER	SPECIAL
XDV	VALVE, DIVERTER, SPECIAL	VALVE	SPECIAL DIVERTER
XFA	TRANSFORMER	TRANSFORMER	NONE
XFMR	TRANSFORMER	TRANSFORMER	NONE
XHP	TRANSMITTER AUXILIARY POWER SUPPLY	TRANSMITTER	AUX PWR SUPPLY
XI	INDICATOR, SPECIAL	INDICATOR	SPECIAL
XIC	CONTROLLER, INDICATING, SPECIAL	CONTROLLER	SPECIAL INDICATI
XIS	SWITCH, INDICATING, SPECIAL	SWITCH	SPECIAL
XM	MODIFIER, SPECIAL	COMPUTATION	SPECIAL
XMTR	TRANSMITTER	TRANSMITTER	NONE
XR	RECORDER, SPECIAL	RECORDER	SPECIAL
XRJB	JUNCTION BOX, SPECIAL	BOX	SPECIAL, JUNCTION
XS	SWITCH, SPECIAL	SWITCH	SPECIAL
XSW	SWITCH, TRANSFER	SWITCH	TRANSFER
XT	TRANSMITTER, SPECIAL	TRANSMITTER	SPECIAL
XX	POWER SUPPLY, SPECIAL	POWER SUPPLY	SPECIAL
ZI	INDICATOR, ZONE (POSITION)	INDICATOR	ZONE
ZS	SWITCH, ZONE (POSITION)	SWITCH	ZONE