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1. Introduction

The equipment qualification (EQ) standard 331-186 (Equipment Qualification Programme) provides the requirements for the establishment and implementation of the equipment qualification (EQ) programme. These requirements are in line with the Interim Regulatory Guide RG-0027 (Ageing Management and Long Term Operations of Nuclear Power Plants) for equipment qualification. Furthermore, the Koeberg Safety Analysis Report SAR II-1.11 (Environmental Qualification for Accident Conditions) does not require a formal equipment qualification programme to be developed for mechanical structures, systems, and components (SSCs).

Mechanical equipment qualification (MEQ) programmes were developed for a number of plants to comply with the requirements of 10 CFR50, Appendix A, General Design Criteria (GDC) 4 (Environmental and Dynamic Effects Design Bases), and NUREG-0800 (Standard Review Plan Section - Environmental Qualification of Mechanical and Electrical Equipment). GDC-4 requires, in part, that all equipment important-to-safety (electrical and mechanical) be designed to accommodate the environmental effects of postulated accidents, including loss-of-coolant accident (LOCA).

Currently, the nuclear industries principally rely on design standards, preventive maintenance, periodic inspection, and surveillance testing to assess the capability of mechanical equipment and to ensure proper functioning under normal and design basis accident (DBA) conditions. Additionally, some utilities provided assurance that mechanical equipment would perform as intended under seismic conditions by complying with the American Society of Mechanical Engineers (ASME) codes and performing seismic analyses and tests.

This Nuclear Engineering position paper (NEPP) provides the assessment of the requirements for the qualification of active mechanical equipment whose function is required to ensure the safe operation or safe shutdown of the KNPS. In addition to these requirements, this NEPP provides the Koeberg position on how these requirements are complied with based on the applicable design and construction codes and standards and existing plant programmes. It addresses the gap identified during the Koeberg SALTO Peer review in 2022 relating to the qualification of mechanical components.

2. Supporting Clauses

2.1 Scope

The scope of this position paper covers the equipment qualification of mechanical equipment.

2.1.1 Purpose

This position paper provides industry practices relating to equipment qualification of mechanical equipment. The document further provides a position on how Koeberg Nuclear Power Station (KNPS) assures the qualification of mechanical equipment and justification of why a formal mechanical equipment qualification (MEQ) programme is not required.

The position provided in the NEPP address the concern raised during the Koeberg SALTO Peer review in 2022 which found the position document in the previous revision of this NEPP to be inadequate and included no reference to the ASME QME-1 standard (Qualification of Mechanical Equipment Used in Nuclear Facilities).

2.1.2 Applicability

This document shall apply throughout Nuclear Engineering.

2.1.3 Effective date

This procedure is effective from the date of authorisation.

2.2 Normative/Informative References

Parties using this document shall apply the most recent edition of the documents listed in the following paragraphs.

2.2.1 Normative

[1] ISO 9001 Quality Management Systems

[2] 33-186: Equipment Qualification Programme

[3] 331-219: Equipment Qualification Maintenance Manual for Harsh Environment

[4] 331-146: Obsolescence Management Process

[5] 331-186: Equipment Qualification Programme

[6] 331-187: Equipment Qualification Programme Process and Responsibilities

[7] 331-275: Process for the Development and Control of Ageing Management at Koeberg Operating Unit

[8] 331-3: Nuclear Engineering Documentation and Records Work Instructions

2.2.2 Informative

[9] 10 CFR Part 50: Appendix A: General Design Criterion (GDC): Quality Standards and Records

[10] 10 CFR 50.49: Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants

[11] 240-899294359: Nuclear Safety, Seismic, Environmental, Quality, Importance and Management System Level Classification Standard

[12] ASME QME-1: Qualification of Mechanical Equipment Used in Nuclear Power Plants

[13] ASME OM Code: Code for Operation and Maintenance of Nuclear Power Plants

[14] EPRI Report 1021067: EPRI Plant Support Engineering: Nuclear Power Plant Equipment Qualification Reference Manual

[15] IAEA Safety Report Series No 3: Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing

[16] KAA-688: The Corrective Action Process

[17] KGU-029: Monitoring and Trending in Plant Engineering

[18] KGU-033: Failure Investigation of Plant Equipment and Evaluation of Experience

[19] NUREG-0737: Clarification of TMI Action Plan Requirements, Requirements for Emergency Response Capability

[20] NUREG-0800: Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants

[21] NUREG-1482: Guidelines for In-service Testing at Nuclear Power Plants.

[22] RG-0027: Interim Regulatory Guide: Ageing Management and Long Term Operations of Nuclear Power Plants

[23] Regulatory Guide 1.100: Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants

[24] Regulatory Guide 1.89: Environmental Qualification of Certain Electrical Equipment, Important to Safety for Nuclear Power Plants

[25] SAR II-1.11: Environmental Qualification for Accident Conditions Inside Containment

2.3 Definitions

2.3.1 Active Mechanical Equipment: Mechanical equipment containing moving parts, which, in order to accomplish its required function as defined in the Qualification Specification, must undergo, or prevent mechanical movement. This includes any internal components or appurtenances whose failure degrades the required function of the equipment.

2.3.2 Abnormal Operating Conditions: Any deviation from normal conditions anticipated to occur often enough that the design should include a capability to withstand the conditions without operational impairment.

2.3.3 Accident Conditions: A single event not reasonably expected during the course of plant operation that has been hypothesized for analysis purposes or postulated from unlikely but possible situations or that has the potential to cause a release of radioactive material.

2.3.4 Class 1E: Safety classification of the electrical equipment and systems that are essential to emergency reactor shutdown, containment isolation, reactor core cooling, and containment and reactor heat removal, or are otherwise essential in preventing significant release of radioactive material to the environment.

2.3.5 Design Basis Events: Postulated events used in the design to establish the acceptable performance requirements for structures, systems and components.

2.3.6 Design Extension Conditions: Accident conditions that are not considered for design basis events, but that are considered in the design process of the facility in accordance with best estimate methodology, and for which releases of radioactive material are kept within acceptable limits. Design extension conditions include severe accident conditions.

2.3.7 Design Life: The time during which satisfactory performance can be expected for a specific set of service conditions (the time may be specified in real time, number of operating cycles, or other performance intervals, as appropriate).

2.3.8 Environmental Qualification: A process for ensuring that equipment will be capable of withstanding the ambient conditions that could exist when the specific function to be performed by the equipment is actually called upon to be performed under accident conditions. For environmental qualification, the central concern involves the threat to non-metallic components of electrical and I&C components due to stresses from severe environmental service conditions resulting from a LOCA or HELB (including SLB).

2.3.9 Equipment Qualification: Generation and maintenance of evidence to ensure that the equipment will operate on demand, under specified conditions, to meet system performance requirements**.**

Equipment Qualification = Environmental Qualification + Seismic Qualification

2.3.10 Harsh Environment: Harsh environments are the result of a LOCA or HELB (including SLB) inside containment and post-LOCA or HELB outside containment.

2.3.11 Installed life: The interval from installation to removal during which the equipment or component thereof may be subject to design service condition and system demands.

2.3.12 Qualification Margin: The amount by which the qualification condition levels exceed the service condition levels.

2.3.13 Mechanical Component: Those items of a plant such as pumps, valves, vessels, and piping (may be used interchangeably with mechanical component or assembly) that are not categorised as electrical, electronic components or civil structures.

2.3.14 Mild Environment: An environment that would at no time be significantly more severe than the environment that would occur during normal plant operation, including anticipated operational occurrences.

2.3.15 Qualification: The generation and maintenance of evidence to ensure/demonstrate that the equipment can meet its specified service conditions in accordance with the qualification specification.

2.3.16 Qualified Condition: Condition of equipment, prior to the start of a design basis event, for which the equipment was demonstrated to meet the design requirements for the specified service conditions. This could include certain post-accident cooling and monitoring systems that are expected to remain operational.

2.3.17 Qualified Life: The period for which equipment has been demonstrated, through testing, analysis, or experience, to be capable of functioning within acceptance criteria during specified operating conditions while retaining the ability to perform its safety functions in a design basis accident.

2.3.18 Qualification criteria: Criteria developed from those specific service conditions for which the equipment is to be qualified.

2.3.19 Service Conditions: Actual physical states or influences during the service life of equipment, including normal operating conditions, abnormal operating conditions, design basis event conditions and conditions following a design basis event and design extension conditions.

2.4 Abbreviations

Abbreviation	Explanation
ASCC	Atmospheric Stress Corrosion Cracking Programme
ASME	American Society of Mechanical Engineers
BAC	Boric Acid Corrosion Programme
CHR	Component Health Report
CFR	Code of Federal Regulation
DBA	Design Basis Accident
EDF	Électricité de France
EPRI	Electric Power Research Institute
EQ	Equipment Qualification
FAC	Flow-Accelerated Corrosion Programme
GDC	General Design Criteria
HELB	High-Energy Line Break
ISI	In-Service Inspection
IST	In-Service Testing
LOCA	Loss of Coolant Accident
LTO	Long Term Operation
NRC	Nuclear Regulatory Commission
MEQ	Mechanical Equipment Qualification
MIC	Microbiologically Induced Corrosion Programme
OE	Operating Experience
SAR	Safety Analysis Report
SSCs	Systems, Structures and Components
SRSM	Safety Related Surveillance Manual

2.5 Roles and Responsibilities

Refer to the EQ process document 331-187 (Equipment Qualification Programme Process and Responsibilities), which provides the process and key roles relating to the EQ Programme.

2.6 Process for Monitoring

Procedure 331-187 describes the process for maintaining the qualification of qualified equipment.

2.7 Related/Supporting Documents

Not applicable.

3. Qualification of Mechanical Equipment

The Interim Regulatory Guide RG-0027 requires an equipment qualification programme to achieve and maintain the qualified status of in-scope SSCs to be implemented. RG-0027 does not specifically require a mechanical equipment qualification programme to be established. The EQ requirements for KPNS are contained in the EQ standard 331-186 and the scope of the EQ Programme is limited to electrical, instrumentation and control equipment. This is in line with the EQ Rule 10 CFR 50.49 (Environmental qualification of electric equipment important to safety for nuclear power plants) and operating experience from other nuclear power plants.

The Koeberg Safety Analysis Report SAR II-1.11 (Equipment Qualification for Accident Conditions) does not require a formal equipment qualification programme to be developed for mechanical structures, systems, and components (SSCs). The Safety Analysis Report SAR II-1.11, Table T-II-1.11-1 and KBA 122 E02 038, “General Specification for Qualification to DBA Conditions” provide conditions that must be applied for qualification of in-scope equipment.

The ASME Committee on Qualification of Mechanical Equipment Used in Nuclear Power Plants (QME) issued the ASME QME-1 standard to provide the requirements and recommended practices to qualify active mechanical equipment to meet specified functional requirements during operation and during or after any postulated abnormal or accident conditions. This Standard does not apply to electric components such as motors, electric valve actuators, instrumentation, and control devices, which are qualified by conformance with the appropriate IEEE standard.

The ASME QME-1 is divided into the following sections:

a. General Requirements
b. Qualification of Dynamic Restraints
c. Qualification of Pump Assemblies
d. Qualification of Valve Assemblies

Note: The foreword to the standard indicates that it may be applied to future NPPs or existing operating NPP component replacements, modifications, or additions, as determined by regulators and the licensees. ASME QME-1-2017 provides functional qualification guidance for pumps, valves, dynamic restraints, and non-metallic parts for those components.

In accordance with the ASME QME-1, the pressure boundary integrity and structural supports of active mechanical equipment shall be qualified in accordance with the applicable design codes and standards. At KNPS the equipment is designed and qualified to perform the required safety function in accordance with the ASME III construction Code sections and applicable design standards as referenced in the SAR.

The above requirements of ASME QME-1 are discussed in this NEPP, and conclusions are drawn on the comprehensiveness of the current KNPS design process and monitoring/maintenance programmes to ensure and maintain the qualification of active mechanical components. This is to address the gap identified during the Koeberg SALTO Peer review in 2022 relating to the qualification of mechanical components.

Credit is taken for the existing In-service Inspection (ISI) and In-service Testing (IST) programmes, the Preventive Maintenance programme activities, and the design process. This NEPP at the time of the SALTO review provided general statements with no equipment specific and systematic assessment to compare the original equipment design and operating experience with relevant standards for qualification of mechanical equipment.

The U.S. NRC requirements for qualification of mechanical equipment is generally governed by General Design Criterion 4, “Environmental and dynamic effects design bases,” of Appendix A to 10 CFR Part 50 (General Design Criteria for Nuclear Power Plants). For mechanical equipment located in a harsh environment, compliance with the environmental design provisions of GDC 4 are generally achieved by demonstrating that the non-metallic parts/components are suitable for the postulated design basis environmental conditions. Koeberg aligns with this practice as demonstrated in Section 3.2 of this document. Mechanical components are not required to be qualified specifically to the requirements of 10 CFR 50.49 (The environmental qualification rule for electric equipment).

Further details regarding the industry practices relating to MEQ is provided in Section 3.8.

It must be noted that although the scope of this NEPP and the practices and the position is equally applicable to passive complement. As part of the ageing assessment for Long Term Operation (LTO), both the passive and active components were included in the scope of the assessment.

3.1 Scope of mechanical SSCs subject to EQ

The scope covered in this position paper includes mechanical equipment whose function is required to ensure the safe operation, safe shutdown, maintaining safe shutdown conditions and mitigating the consequences of an accident of a nuclear power plant.

For Koeberg, mechanical components required to fulfil the aforementioned safety functions, are design basis components and are assigned design safety classes: 1, 2, 3, LS in accordance with the classification standard 240-8929359 (KSA-010) (Nuclear Safety, Seismic, Environmental, Quality and Importance Classification). The classification system used at KNPS, and a detailed description of the classification categories is provided in this standard. The design safety classification is in accordance with ANSI 18.2 (American National Standard Nuclear Safety Criteria for the Design of Stationary Pressurised Water Reactor Plants).

The scope also considers other components whose failure may prevent SSCs important to safety from fulfilling their intended functions. For Koeberg, this equipment is classified for seismic impact as seismic class 1A, 1P, and ND, and safety class LS.

Refer to Appendix A and Appendix B of this document for a list of in-scope components. The equipment listed are Safety Class 1, 2 and 3 mechanical components and the emergency diesel generator components. The scope was determined from the scope of the In-service Testing Programme (IST), PM Programme scope and the SALTO in scope list is provided in L1124-GN-LIS-020(Comprehensive List of all SSCs Reviewed for SALTO Scoping Requirements).

3.2 Preventive actions to minimise and control ageing

Similar to most nuclear plants, Koeberg Nuclear Power Station (KNPS) relies on the design process, preventive maintenance programme, periodic inspections, surveillance and testing to assess the capability of mechanical equipment and to ensure proper functioning under normal and accident conditions as confirmed by the ageing management process.

For mechanical components assigned design safety classes 1, 2, and 3, the application of nuclear design codes and standards provides for the suitability for normal and accident service conditions and assurance are provided by programmes such as the In-service Inspection programme (ISI), Safety Related Surveillance Manual (SRSM), In-service testing (IST) programme and Operating Technical Specifications (OTS). The assurance is maintained for the duration of the plant operating life.

The following subsections provide requirements and practices for establishing and preserving the qualification of active mechanical equipment.

3.2.1 Plant design and modifications

- **Design requirements (related to equipment ageing)**

In accordance with the regulatory guide RG-0027, during the design stage of the nuclear power plant (NPP), it must be demonstrated that ageing has been adequately considered both in the provision of design margins and the provisions for monitoring, testing, sampling, and inspection to assess ageing mechanisms, verify predictions, and identify unanticipated behaviours or degradation.

The applicable laws, regulations, codes, and standards that were used in the design, construction, and manufacture of KNPS were those used in EDF's CP1 design reference station, Tricastin (as accepted by the NNR). The original design files (DSE's) and Safety Analysis Report (SAR) provide the information regarding the design of plant SSCs important to safety. The DSEs provides the information such as the required safety function of the systems, structures, and components (SSCs), design paraments (i.e., design and operating pressures, temperature, and flow) and design codes.

Refer to an example of the DSE information relating to the design of the Reactor Coolant System (RCP), KBA 1217RCP007, Chapter 7 included below. This is to illustrate that qualification of SCs were considered at the design stage.

7.3.4. Equipment qualification

Document 153 KBY 7202 includes a list of equipment which must operate in the reactor containment in the event of design basis accident or similar conditions.

The following items of RCP system equipment are qualified :

- Valves RCP 212 and 215 VP

  These valves form part of the reactor coolant pressure boundary, as second isolation devices, and are used with all of the RRA system following a steam line break accident. As a result, these valves are qualified for those ambient conditions which prevail in the containment and which are specified in the contract for the qualification of equipment having to operate in the containment following reactor coolant piping break.

- Pressurizer heaters, RCP 05 and 06 RS

- Pressurizer level sensors, RCP 07, 08 and 11 MN

- Pressurizer pressure sensors, RCP 05, 06, 13 MP

- Reactor coolant system pressure sensors, located at RRA intake, RCP 37, 39 MP

- Hot leg temperature sensors, RCP 28, 43, 55 MT.

Figure 1: Extract from RCP Design File KBA 1217RCP007

Another example is provided below which is taken from the Residual Heat Removal (RRA) system Design File KBA1217RRA007:

7.3.3. Equipment qualification

In addition to withstanding earthquakes, provision has been made for RRA system to be utilized after a steam pipe break.

As a result, equipment which are required for cold shutdown, are qualified for ambient conditions prevailing in the containment following a steam pipe break.

Figure 5.1. in chapter 5 shows temperature and pressure variations in the containment for this accident. RRA motor-pump assemblies are qualified for these conditions.

For the other components (valves, transmitter sensors), the environmental condition qualification is as indicated in the contract for the qualification of equipment which must function in the containment after a reactor coolant piping rupture.

Figure 2: Extract from the RRA system Design File KBA1217RRA007

The above examples support the position by KNPS to generally rely on the design standards for the capability of mechanical equipment and proper functioning under normal and design basis accident (DBA) conditions. Furthermore, the design parameters provided in the DSEs for these mechanical components are much higher than the EQ profile as provided in the Safety Analysis Report.

The mechanical components (active and passive) and continuously being monitored to provide assurance of the safety functions and to ensure that potential ageing degradations are managed throughout the plant operational life include the period of LTO. Further details regarding ageing assessment and plant programmes implemented is provided in Section 3.2.2 below. These activities also relied on to maintain the original qualification of these components.

- **Plant modifications**

Over time EDF have implemented a number of safety upgrades to their CP1 plants. The applicable modifications were also implemented at KNPS (to align with the EDF upgrades). In addition. In addition, KNPS has performed an extensive External Event Safety Re-assessment following the 2011 accident at Fukushima.

Plant changes are controlled via the design process 331-86 (Design Changes to Plant, Plant Structures or Operating Parameters). Replacements of components are performed in accordance with 331-144, “Standard for the Preparation of an Equivalency Study”. These design change processes (that includes ageing and qualification requirements) and the established EQ requirements ensure that the SSCs are properly assessed to ensure that they are fully qualified to perform their required safety functions.

- **Design documentation**

Through the Period Safety Reviews, it has been confirmed that the plant SSCs that are important to safety are appropriately designed and configured such that there is a high degree of confidence that they will meet the requirements for the safe operation of the plant and align with international benchmarks. Adequate design information, including information on the design basis, has been confirmed to be available to adequately ensure the safe operation and maintenance of the plant and to facilitate the implementation of plant modifications.

3.2.2 Ageing Assessment of active mechanical equipment for LTO

In accordance with the ASME QME requirements, assessment of active mechanical equipment include an analysis and/or evaluation of the active mechanical equipment to determine any significant ageing mechanisms (such as thermal, radiation, corrosion, erosion, vibration, aggressive chemical attack, or wear). The qualification of components is established during design process and the qualification maintained throughout the plant life.

RG-0027 requires that a systematic approach should be applied to manage ageing and obsolescence of SSCs, to ensure that required intended functions are maintained at all times during the operational stage of the lifetime of the NPP. In addition, the existing programmes, and processes relevant to ageing for all in-scope structures or components must be reviewed and validated for LTO.

To achieve the aforementioned regulatory requirements, KNPS has performed a LTO ageing management review (AMR) to evaluate the relevant ageing degradation for in-scope safety related SSCs, reviewed the existing plant programmes and determined the adequacy of the treatment actions implemented to manage ageing. This was to demonstrate that ageing will be effectively managed and monitored for the planned period of LTO for the in-scope SSCs. The AMR was performed in accordance with procedure 240-125122792 (Koeberg Safety Aspects of Long Term Operation (SALTO) Ageing Management Evaluation Process and Revalidation of the Time Limited Ageing Analyses) which is aligned to the IAEA approach and requirements as outlined in in RG-0027 and SSG No. 48.

The outcome of the ageing management review for in-scope mechanical SSCs are provided in the SALTO project consortium report L1124-GN-RPT-023 (*Ageing Management Evaluation (AME) for in-scope mechanical SSCs*). This document sets out the creation of Ageing Couples and the subsequent assignment of relevant ageing mechanisms to mechanical components. It is based on datasets created on the basis of the IGALL master table and the KNPS specific ageing management matrix. The consortium report contains the recommendations for improvements of the existing ageing management programme in place at KNPS and is based on potential degradation. These recommendations are reviewed and considered by Eskom SMEs as per SALTO Record of Decision (ROD) No. 08016.ROD.023.

The mechanical components are managed through the implementation of the following plant programmes:

- **In-Service Testing (IST) Programme**

The intent of the ISTPRM is to establish assurance on the operability readiness of pressure retaining safety related components under all design basis conditions. This assurance is established by means of a variety of periodic surveillances. The operability readiness statement confirms that the design basis safety functions of IST components remain within acceptable limits throughout their lifetime. The requirements are contained in the IST programme manual 240-97087308 (Fourth Interval In-Service Testing Programme Requirements Manual (ISTPRM)) which includes in-service testing for pumps, valves, and snubbers). Refer to the ISTPRM for specific testing requirements for the active components within the scope of the programme.

- **Motor Operated Valves Programme**

In addition to the IST programme, the MOV programme has been established to ensure that the safety-related MOVs continue to be capable of performing their design-basis safety functions. The MOV programme requirements are provided in the manual 240-149053169 (Motor Operated Valve Programme Requirements Manual (MOVPRM)).

The intent of the programme is to establish the periodic testing requirements in order to confirm that MOVs will continue to fulfil their intended design function following the close out of US NRC Generic Letter GL 89-10 (at Koeberg this was achieved by the completion of mod 99087). The preventative actions are carried out during plant operation (valve stroking via different periodic testing or during in-service testing or pre-service testing). Another preventative action is through regular maintenance in accordance with the reliability processes, or reactive maintenance following unacceptable test results such as, but not limited to, lubrication, tightening torque adjustment, valve repack, actuator settings adjustment, spring pack replacement, etc.

- **Preventive Maintenance Programme**

The PM Programme, as reflected in the IQ review database, provide preventive maintenance activities of all safety and production related equipment and it is performed periodically to ensure the operability and reliability. These activities include replacement of non-metallic parts and lubricants.

The maintenance life of a particular active mechanical equipment item may be changed during its installed life where justified. For example, the life of an active mechanical equipment may be limited by certain internal components or appurtenances that have a shorter useful life than the installed life of the equipment. By periodic replacement of those internal components or appurtenances, the reliable life of the active mechanical equipment may be extended.

The PM Programme implemented at KNPS provide maintenance activities of all safety and production related equipment, thereby ensuring continued reliable operation of all qualified mechanical equipment. All the applicable maintenance activities are found in the IQ Review database.

- **In-service Inspection (ISI) Programme**

The in-service inspection (ISI) Programme at Koeberg is governed by ASME Section XI requirements for the examination and testing of ASME Class 1, 2, 3, MC, and CC components and component supports. The requirements for the ISI programme are contained in the ISI standard 240-110745414 (KSA-021) - Standard for In-service Inspection Programme at Koeberg Nuclear Power Station) and programme manual 240-119362012 Fourth Interval In-Service Inspection Programme Requirements Manual (ISIPRM) for Koeberg Nuclear Power Station.

The ISIPRM summarises the in-service inspection programme (ISIP) requirements for the examination and testing of ASME Class 1, 2, 3, MC, and CC components and component supports during the fourth inspection interval.

- **Nuclear Steam Supply System Design Transient Monitoring Programme**

The Nuclear Steam Supply System (NSSS) Transient Monitoring Programme is a result of a National Nuclear Regulatory (NNR) requirement as documented in 36-197 (Koeberg Licensing Basis Manual). The purpose of tracking the transients is to ensure compliance with the Koeberg design basis for all Safety Class 1 piping and pressure vessel components. The design base transients for Koeberg are defined and described in document KBA0022E00006 (Nuclear Steam Supply Design Transients).

- **Anchor Bolting Programme**

The programme caters for the degradation of all Safety Class 1, 2 and 3 tie-rods anchored to concrete structures with pre-stressing, or/and installed through concrete walls and floors which are tightened by means of hydraulic tensioning equipment. The programme requirements are contained in document 240-138623765 (Anchor Bolting Programme Requirements Manual).

- **Atmospheric Stress Corrosion Cracking**

The scope of examinations is an augmentation to the ASME required inspections contained in the ISIPRM AUG-14 (240-119362012 AUG-14 ISIPRM). This module provides the augmented in-service inspection (ISI) monitoring and inspection requirements for Eskom to employ in the management of atmospheric stress corrosion cracking (ASCC) on nuclear safety related components, as a permanent degradation mechanism at Koeberg. The initial inspection scope included the safety injection (RIS) and containment spray (EAS) systems' piping in the reactor spent fuel pool (PTR) tank rooms and the fuel buildings of both units. These systems are required for mitigation of ANSI N18.2-1973 Condition III and IV occurrences, classified as infrequent incidents and limiting faults respectively.

The programme manual 240-147386602 (Atmospheric Stress Corrosion Cracking of Austenitic Stainless Steel Components) provide the technical basis for the ASCC programme, stipulate the specific requirements for the programme, and set the acceptance criteria for inspections/programme elements.

- **Boric Acid Corrosion Control Programme**

The programme is to manage the risk associated with boric acid leaks and corrosion. Document 331-511 (Engineering Guide for Boric Acid Corrosion Control (BACC) Programme Management) describes the scope for the Koeberg BACC Programme. This document also describes the relationship between the BACCP and the overall Koeberg Leak Management Process (KAA 802). The objective of the leak management programme is to ensure, through inspection, early identification and mitigation of plant leaks such as boric acid, water, oil, air, and gas leaks. (Boric acid affecting bolting is dealt with under ISIPRM).

- **Containment Leak Rate Testing Programme**

Containment isolation valves and apertures with a leak rate requirement shall be tested in accordance with Koeberg's CLRTPRM which meets the intent of the US 10CFR50, Appendix J. Requirements are contained KBA0028NESMACLR003 (Containment Leak Rate Test Programme Manual).

- **Corrosion Management Programme**

The programme provides for regular and systematic inspection and maintenance activities that will ensure the corrosion protection of plant, structures, and equipment, in a manner that will facilitate proper planning of resources, effective budgeting, and will provide the opportunity of identifying specific areas of concern with the need for upgrading of existing corrosion protection specifications. This programme is applicable to all structures, systems, equipment, and items of plant which are subject to environmental corrosion. The scope of this programme encompasses all buildings, structures, plant, and equipment within and including the boundary/game fence.

- **Thermal Fatigue Monitoring Programme**

The Thermal Fatigue Management Programme describes the in-service operationally determined thermal fatigue issues that have arisen during the plant lifetime (including feedback from the EDF 900 MWe fleet) and the actions taken (including those in progress) to address and manage the issues identified which potentially affect the design base integrity of the impacted plant components. Refer to document 240-141494955 (Thermal Fatigue Management Programme).

- **Flow Accelerated Corrosion Programme**

The programme sets the requirements for all applicable components potentially affected by FAC to manage potential degradation, prevent equipment failures, and maintain equipment under pressure within the design wall thicknesses. Document 331-173 provide requirements for the FAC Programme.

- **Fire Protection**

Life of plant plan (LOPP) document KBA0022NNEPOLOPP023 (Fire Detection and Suppression Systems) summarises the proposed maintenance and testing regimes and life cycle plan for the Koeberg fire detection and protection systems.

- **Heat Exchanger Programme**

Heat exchangers are used extensively in the nuclear power generation industry. Their efficient and reliable operation is essential for safe and reliable nuclear plant operation. Increased emphasis on heat exchanger reliability at nuclear power plants has resulted in the development of engineering programmes or equivalent actions to maintain the required thermal performance and structural integrity. The programme document 240-154215724 (Heat Exchanger Management Programme) the requirements for monitoring of heat exchangers at Koeberg Nuclear Power Station The programme shall identify all the degradation mechanisms that affect heat exchangers. Monitoring regimes for these degradation mechanisms will be addressed.

- **Reactor Vessel Surveillance Programme**

The programme manages the reactor pressure vessel material embrittlement as a result of neutron irradiation. The surveillance program is required to ensure that the resultant mechanical properties of the vessel are adequate for all operating conditions during the vessel design life. The scope of this position paper is the irradiation embrittlement monitoring and end of life embrittlement predictions of the belt line of the reactor pressure vessels of Unit 1 and 2.

- **Leak management Process**

This process KAA-802 (Leak Management Process) provides a proactive approach for preventing leaks and ensures aggressive and timely identification, investigation, and repair of leaks found on plant SSCs. The scope is intended to address Power Block Equipment leaks on the conventional island and nuclear island. The leakage from plant SSCs which may include High-energy process fluids (steam), non-borated water, Borated water, Chemicals, Gases (air, hydrogen, nitrogen, etc.) and Oil.

- **Safety Related Surveillance Manual (SRSM)**

The Safety Related Surveillance Manual (SRSM) defines the objective of simulating as best possible, as-designed safety related operational conditions by a periodic test programme and specifies the scope and validity of the periodic test requirements. It further describes the acceptance criteria for the periodic tests and surveillances. The SRSM includes the requirements for safety related mechanical equipment including valves, pumps, snubbers, airlocks, etc. Refer to SRSM document KBA-0022-SRSM and related SRSM test documents for specific requirements.

- **Operating Technical Specification (OTS)**

The Technical Operating Specification (OTS) defines the:

  - the plant normal operating limits necessary to remain within the reactor design assumptions which were defined during the design phase of the units. These include the physical limits that preserve the integrity of the barriers, ensure the effectiveness of the safety functions, and maintain the reactor within the initial assumptions for analysed incidents and accidents.
  - the operability requirements of essential safety functions necessary for control, protection and safeguarding of the barriers. In addition, it addresses the requirements for systems and safety functions required by the incident and accident procedures. During the design phase, safety functions were developed for prevention and detection of incidents and accidents and to limit the consequences of incidents and accidents.
  - prescribe the actions required if a normal operating limit is exceeded or a required safety function is inoperable. During normal operation, it is necessary to identify and prioritise the necessary actions for a deviation from design requirements.

- **New Ageing Management Programmes**

In addition to the above, the following new AMPs have also developed and are being implemented for mechanical components. See the AMP list 240-150483693 (Ageing Management Programmes List) for the scope and details relevant programme references. Selective Leaching Ageing Management Programme

- One-time Inspections Ageing Management Programme
- One-time inspections of Class1 Small Bore Piping Ageing Management Programme
- Pressuriser Programme
- Internal Surfaces, Coatings and Linings Ageing Management Programme

3.2.3 Seismic Qualification of active mechanical equipment

The seismic qualification of active mechanical equipment should demonstrate the ability of the active mechanical equipment to perform its specified function during and/or after the time it is subjected to the earthquake loadings defined in the seismic qualification specification.

The requirements for the seismic qualification of active mechanical equipment at KNPS are described and documented in the design specification guide DSG-318-033 (Specification for Seismic Qualification of Electrical and Mechanical Equipment). The specification establishes acceptable methods to seismically qualify equipment for service at KNPS. Any deviation from the requirements of US NRC Regulatory Guide RG1.100, requires review and approval by Koeberg' Nuclear Engineering. The requirements in DSG-318-033 is also the design specification used for new and replacement components.

The description of seismic analysis for the primary circuit (all active mechanical equipment) is provided in design document KBA0022E06002 (Description of Seismic Analysis Applicable to Reactor Coolant System Equipment).

The KNPS seismic design specification DSG-318-033 also reference the ASMEQME-1 and the US NRC regulatory guide RG1.100. The seismic qualification of the active mechanical components installed at KNPS satisfy the ASME QME-1 requirements and demonstrate that active mechanical equipment in nuclear power plants can function during or following design basis earthquake (seismic) loads. The equipment qualification is maintained through the implementation of the maintenance activities including the replacement of non-metallic components at a pre-defined frequency as discussed in Section 3.2.

3.2.4 Qualification of Non-metallic Parts

ASME QME-1 provides guidance for demonstrating and maintaining the environmental qualification of non-metallic parts. It provides guidance for the use of non-metallic test data, documented service life information, analysis, and qualification testing as means of demonstrating the environmental qualification of non-metallic parts.

Generally, non-metallic parts in mechanical equipment are more susceptible to degradation resulting from normal, abnormal, and accident environmental and service conditions than metallic parts are. The qualification of the non-metallic parts in mechanical equipment should be demonstrated for the applicable postulated service and environmental conditions to ensure that the equipment can perform its intended safety function.

If during the course of their service life, non-metallic parts are exposed to conditions not bounded by the qualification, their ability to withstand these conditions should be evaluated, and as appropriate, further qualification should be performed. This additional qualification may result in shorter qualified life, increased surveillance requirements, or the need for the use of another material.

Once qualified mechanical equipment is installed, its qualified condition should be preserved through appropriate preventive maintenance, testing, and monitoring**.** At Koeberg this is achieved via the PM programme and the programmes included in Section 3.2.

At KNPS, non-metallic are periodically replaced in accordance with the PM Programme as reflected in IQ Review. Any time that the non-metallic is disturbed, such as during corrective maintenance, it should be returned to the condition assumed or simulated in the qualification. The PM Programme specified the tasks to overall mechanical components component, and it is a requirement to replace that all covers, seals and gaskets and gaskets.

3.2.5 Shelf life preservation requirements

The process to manage the stores shelf life of items is defined in KAA-716, “Shelf Life Process’. The process includes actions to:

- Identify items that are required to be managed with the shelf life programme.
- Specify shelf life programme requirements.
- Receive items and update shelf life expiry dates and batch numbers on SAP database when processing Goods Receipt on SAP.
- Store item in the correct storage environment and package.
- From the shelf life SAP database, review all expired shelf life items on a monthly basis.

3.3 Detection of ageing or other effects

Actions to detect ageing effects of mechanical components are covered in the existing plant programmes listed in Section 3.2. These include periodically inspecting and/or testing in-scope equipment.

3.4 Monitoring and trending of ageing

Monitoring and trending requirements are established as part of the ageing management requirements and described in the various programmes listed in 3.2. These include:

- Monitoring of environmental conditions during normal operation in accordance with 240-165386950 (Environmental Condition Monitoring Programme (ECMP) for Electrical Cables and Qualified Equipment)
- Inspecting and testing in-scope equipment with appropriate techniques;
- System walk-downs to look for visible signs of anomalies attributable to ageing;
- Monitoring and trending of in-scope equipment condition; and
- Verifying that the plant configuration meets the design configuration.

In accordance with KGU-029 (*Monitoring and Trending in Plant Engineering*), system engineers are required to perform system/equipment performance monitoring and to develop and maintain Component Health Reports (CHRs), System Health Reports (SHRs), Life of Plant Plans (LOPPs), Maintenance Bases and engineering assessments/overviews. System monitoring and trending provides opportunities to identify changes in trend, failures in their incipient stages and determines corrective actions required to ensure reliable performance.

3.5 Mitigating ageing

Actions described in the existing programmes listed in Section 3.2 for mechanical SSCs which are viewed as mitigating actions include:

- Adaption of operating and maintenance parameters to prolong life and/or improve reliability
- Component replacement (also known as partial replacement).
- Complete replacement of equipment.

3.6 Acceptance Criteria

The acceptance criteria of the mechanical equipment are established as part of the existing programmes listed in Section 3.2.

3.7 Corrective Actions

In the equipment qualification programme, if the in-scope equipment is found to be outside the bounds of its qualification basis (e.g., environment, ageing conditions, configuration, etc.), corrective actions are implemented in accordance with the plant's corrective action programme as defined in KAA-688 (*The Corrective Action Process*) or as dictated by the base code of the relevant programme.

Failure or unexpected wear out of equipment during the service life of the associated component is evaluated (via the DevonWay "Component Failure (CF") to determine whether the condition resulted from a random defect or stress that was not fully considered during the design and/or maintenance strategy. If the condition resulted from such a stress, appropriate action, such as eliminating the stress, limiting the life of the equipment, or adapting the operational/maintenance requirements are taken in line with KAA-688 and CF process KGU-033 (Failure Investigation of Plant Equipment and Evaluation of Experience).

The experiences gained from these investigations are used to prevent recurrence, improve the Maintenance strategies, and compile equipment failure statistics for trending purposes. A corrective action is taken after a condition is identified that restores the equipment to an acceptable condition of capability.

3.8 Operating Experience and feedback of research and development results

The existing programmes implemented at KNPS includes provisions for the continuous review of plant-specific and industry operating experience, including research and development results, such that the impact on the programme is evaluated and any necessary actions or modifications to the

PAIA section 36(b).Redacted as it 3rd Party Operating Experience

PAIA section 36(b).Redacted as it 3rd Party Operating Experience

PAIA section 36(b).Redacted as it 3rd Party Operating Experience

PAIA section 36(b).Redacted as it 3rd Party Operating Experience

3.9 Quality Management

Site quality assurance procedures, review and approval processes, and administrative controls are applied to all KNPS activities including the ISI, IST, PM, SRSM programme and other AMPs.

4. Acceptance

This document has been seen and accepted by:

Name	Designation
R Cassim	Manager - Materials Reliability Group
R Menacere	Senior Engineer – Materials Reliability Group
A Kotze	Chief Engineer – Nuclear Engineering

5. Revisions

Date	Rev.	Compiler	Remarks
October 2022	3	K Moroka	Document updated with the assessment of the ASME QME-1 standard and to address the gap identified during the Koeberg IAEA SALTO Peer Review conducted in 2022 relating to the qualification of mechanical components.
September 2020	2	KI Moroka	Document reviewed as per 331-3.
March 2016	1	KI Moroka	New position developed to document Koeberg's position with regard to the environmental qualification of mechanical equipment.

6. Development Team

Not applicable

7. Acknowledgements

Not applicable

Appendix A - Scope considered for Mechanical EQ

Unit/s	Equipment	Description	Type	Action Type
12	APG004VL	001 GV BLOWDOWN PENETRATION #401	Globe	Air
12	APG005VL	002 GV BLOWDOWN PENETRATION #402	Globe	Air
12	APG006VL	003 GV BLOWDOWN PENETRATION #403	Globe	Air
12	ARE031VL	001 GV FEED WATER FLOW CONTROL	Globe	Air
12	ARE032VL	002 GV FEED WATER FLOW CONTROL	Globe	Air
12	ARE033VL	003 GV FEED WATER FLOW CONTROL	Globe	Air
12	ARE034VL	001 GV FEED WATER FLOW ISOLATION	Gate	Motor
12	ARE035VL	002 GV FEED WATER FLOW ISOLATION	Gate	Motor
12	ARE036VL	003 GV FEED WATER FLOW ISOLATION	Gate	Motor
12	ARE037VL	001 GV FEED WATER ISOLATION PEN #507 NRV	Swing NRV	Air Assist
12	ARE038VL	002 GV FEED WATER ISOLATION PEN #509 NRV	Swing NRV	Air Assist
12	ARE039VL	003 GV FEED WATER ISOLATION PEN #505 NRV	Swing NRV	Air Assist
12	ARE040VL	001 GV FEED WATER ISOLATION PEN #507 NRV	Swing NRV	Self
12	ARE041VL	002 GV FEED WATER ISOLATION PEN #509 NRV	Swing NRV	Self
12	ARE042VL	003 GV FEED WATER ISOLATION PEN # 505 NRV	Swing NRV	Self
12	ARE242VL	001 GV FEED WATER FLOW BYPASS CONTROL	Globe	Air
12	ARE243VL	002 GV FEED WATER FLOW BYPASS CONTROL	Globe	Air
12	ARE244VL	003 GV FEED WATER FLOW BYPASS CONTROL	Globe	Air
12	ARE245VL	01 GV FEED WATER FLOW BYPASS DOWNSTREAM ISOLATION	Gate	Motor
12	ARE246VL	02 GV FEED WATER FLOW BYPASS DOWNSTREAM ISOLATION	Gate	Motor
12	ARE247VL	03 GV FEED WATER FLOW BYPASS DOWNSTREAM ISOLATION	Gate	Motor
12	ASG001PO	Motor-Driven Auxiliary Feedwater Pump	Pump	C-H
12	ASG002PO	Motor-Driven Auxiliary Feedwater Pump	Pump	C-H
12	ASG003PO	Turbine-driven Auxiliary Feedwater pump	Pump	C-H
12	ASG005VD	001 PO AUX. FW PUMP DISCH NRV	Swing NRV	Self
12	ASG006VD	002 PO AUX. FW PUMP DISCH NRV	Swing NRV	Self
12	ASG010VD	003 PO AUX. FW PUMP DISCH NRV	Swing NRV	Self
12	ASG012VD	RCP 001 GV AUX. FW CONTROL	Globe	Air
12	ASG013VD	RCP 001 GV AUX. FW CONTROL	Globe	Air
12	ASG014VD	RCP 002 GV AUX. FW CONTROL	Globe	Air
12	ASG015VD	RCP 002 GV AUX. FW CONTROL	Globe	Air
12	ASG016VD	RCP 003 GV AUX. FW CONTROL	Globe	Air
12	ASG017VD	RCP 003 GV AUX. FW CONTROL	Globe	Air
12	ASG018VD	001 GV AUX. FW NRV	Swing NRV	Self
12	ASG019VD	001 GV AUX. FW NRV	Swing NRV	Self
12	ASG020VD	002 GV AUX. FW NRV	Swing NRV	Self
12	ASG021VD	002 GV AUX. FW NRV	Swing NRV	Self
12	ASG022VD	003 GV AUX. FW NRV	Swing NRV	Self
12	ASG023VD	003 GV AUX. FW NRV	Swing NRV	Self
12	ASG024VD	001 GV AUX. FW ISOLATION PEN#228 NRV	Swing NRV	Air Assist
12	ASG025VD	002 GV AUX. FW ISOLATION PEN#229 NRV	Swing NRV	Air Assist
12	ASG026VD	003 GV AUX. FW ISOLATION PEN#227 NRV	Swing NRV	Air Assist
12	ASG027VD	001 GV AUX. FW ISOLATION PEN#228 NRV	Swing NRV	Self

Unit/s	Equipment	Description	Type	Action Type
12	ASG028VD	002 GV AUX. FW ISOLATION PEN#229 NRV	Swing NRV	Self
12	ASG029VD	003 GV AUX FW ISOLATION PEN #227 NRV	Swing NRV	Self
12	ASG126VZ	001 BA GAS PRE. DEPRESS.	Relief	Self
12	ASG131VV	MAIN STEAM TO AUX. FW PUMP TURBINE NRV	Swing NRV	Self
12	ASG132VV	MAIN STEAM TO AUX. FW PUMP TURBINE NRV	Swing NRV	Self
12	ASG133VV	MAIN STEAM TO AUX. FW PUMP TURBINE NRV	Swing NRV	Self
12	ASG135VV	ASG TURBINE OVERSPEED TRIP VALVE	Globe	
12	ASG136VV	ASG TURBINE CONTROL	Globe	
12	ASG137VV	ASG TURBINE STEAM STOP VALVE	Gate	Air
12	ASG138VV	ASG TURBINE STEAM STOP VALVE	Gate	Air
12	ASG148VD	AUX FEED WATER MINIFLOW 003PO NRV	Lift NRV	Self
12	DEG013VD	CHILLED WATER CONTAINMENT ISOLATION PEN #537 (CIV)	Gate	Motor
12	DEG014VD	CHILLED WATER CONTAINMENT ISOLATION PEN #537 NRV (CIV)	Swing NRV	Self
12	DEG043VD	CHILLED WATER CONTAINMENT ISOLATION PEN #538 NRV (CIV)	Lift NRV	Self
12	DEG044VD	CHILLED WATER CONTAINMENT ISOLATION PEN #538 (CIV)	Gate	Motor
12	DEG045VD	CHILLED WATER CONTAINMENT ISOLATION PEN #538 (CIV)	Gate	Motor
12	DEG640VD	TEST CONNECTION FOR CONT. PENETRATION #537 (CIV)	Globe	Manual
12	DEG643VD	TEST CONNECTION FOR CONT. PENETRATION #538 (CIV)	Globe	Manual
12	EAS001PO	Containment Spray Pump	Pump	VLS
12	EAS001VB	PTR TANK SUCTION MOTOR OPERATED	Gate	Motor
12	EAS002PO	Containment Spray Pump	Pump	VLS
12	EAS002VB	PTR TANK SUCTION MOTOR OPERATED	Gate	Motor
12	EAS003VB	PTR TANK SUCTION NRV	Swing NRV	Self
12	EAS004VB	PTR TANK SUCTION NRV	Swing NRV	Self
12	EAS007VB	CONT. SPRAY ISOLATION PENETRATION #109 (CIV)	Gate	Motor
12	EAS008VB	CONT. SPRAY ISOLATION PENETRATION #108 (CIV)	Gate	Motor
12	EAS009VB	CONT. SPRAY ISOLATION PENETRATION #109 (CIV)	Gate	Motor
12	EAS010VB	CONT. SPRAY ISOLATION PENETRATION #108 (CIV)	Gate	Motor
12	EAS011VB	CONT. SPRAY CONT ISOL PENETRATION #109 NRV(CIV)	Swing NRV	Self
12	EAS012VB	CONT. SPRAY CONT ISOL PENETRATION #108 NRV(CIV)	Swing NRV	Self
12	EAS013VB	EAS SUMP RECIRC. CONT. ISOLATION PENETRATION #107(CIV)	Gate	Motor
12	EAS014VB	EAS SUMP RECIRC. CONT. ISOLATION PENETRATION #106(CIV)	Gate	Motor
12	EAS017VB	EAS SUMP SUCTION NRV	Swing NRV	Self
12	EAS018VB	EAS SUMP SUCTION NRV	Swing NRV	Self
12	EAS113VB	TEST CONNECTION FOR CONT. PENETRATION #107 (CIV)	Globe	Manual
12	EAS114VB	TEST CONNECTION FOR CONT. PENETRATION #106 (CIV)	Globe	Manual
12	EAS125VR	NaOH INJECTION LINE ISOLATION	Ball	Air
12	EAS126VR	NaOH INJECTION TEST	Ball	Motor
12	EAS131VB	CONT. SPRAY TEST LINE	Gate	Motor
12	EAS132VB	CONT. SPRAY TEST LINE	Gate	Motor
12	EAS133VB	CONT. SPRAY TEST LINE	Gate	Motor
12	EAS134VB	CONT. SPRAY TEST LINE	Gate	Motor
12	EAS145VR	NaOH TO EAS 001 EJ	Ball	Motor

Unit/s	Equipment	Description	Type	Action Type
12	EAS146VR	NaOH TO EAS 002 EJ	Ball	Motor
12	EAS151VR	EAS 001 EJECTOR NRV	Swing NRV	Self
12	EAS152VR	EAS 002 EJECTOR NRV	Swing NRV	Self
12	EAS166VB	TEST CONNECTION FOR CONT. PENETRATION #108 (CIV)	Globe	Manual
12	EAS167VB	TEST CONNECTION FOR CONT. PENETRATION #109 (CIV)	Globe	Manual
12	EAS184VB	TEST CONNECTION FOR CONT. PENETRATION #109 (CIV)	Globe	Manual
12	EAS185VB	TEST CONNECTION FOR CONT. PENETRATION #108 (CIV)	Globe	Manual
12	EAS220VB	MOD 99009 EAS BACKUP NRV	Swing NRV	Self
12	EAS903VE	MOD 99009 EAS BACKUP manual isolation valve	Globe	Manual
12	EBA001VA	CONT. ISOLATION PENETRATION #503 (CIV)	Butterfly	Motor
12	EBA002VA	CONT. ISOLATION PENETRATION #503 (CIV)	Butterfly	Motor
12	EBA003VA	CONT. ISOLATION PENETRATION #501 (CIV)	Butterfly	Motor
12	EBA004VA	CONT. ISOLATION PENETRATION #501 (CIV)	Butterfly	Motor
12	EBA013VA	CONT. ISOLATION PENETRATION #502 (CIV)	Butterfly	Motor
12	EBA014VA	CONT. ISOLATION PENETRATION #502 (CIV)	Butterfly	Motor
12	EBA015VA	CONT. ISOLATION PENETRATION #504 (CIV)	Butterfly	Motor
12	EBA016VA	CONT. ISOLATION PENETRATION #504 (CIV)	Butterfly	Motor
12	EPP114VA	AIRLOCK (8M) ADMISSION ISOLATION (CIV)	Ball	Motor
12	EPP115VA	AIRLOCK (8M) EXHAUST ISOLATION (CIV)	Ball	Motor
12	EPP116VA	AIRLOCK (8M) TEST ISOLATION (CIV)	Ball	Motor
12	EPP120VA	AIRLOCK (8M) SAFETY ISOLATION (CIV)	Ball	Motor
12	EPP214VA	AIRLOCK (0M) ADMISSION ISOLATION (CIV)	Ball	Motor
12	EPP215VA	AIRLOCK (0M) EXHAUST ISOLATION (CIV)	Ball	Motor
12	EPP216VA	AIRLOCK (0M) TEST ISOLATION (CIV)	Ball	Motor
12	EPP220VA	AIRLOCK (0M) SAFETY ISOLATION (CIV)	Ball	Motor
12	EPP900VA	TEST CONNECTION FOR CONT. PENETRATION #224a (CIV)	Globe	Manual
12	EPP901VA	TEST CONNECTION FOR CONT. PENETRATION #224b (CIV)	Globe	Manual
12	ETY003VA	CONT. ISOL. PENETRATION #221 (CIV)	Butterfly	Air / Motor
12	ETY004VA	CONT. ISOL. PENETRATION #222 (CIV)	Butterfly	Air / Motor
12	ETY005VA	CONT. ISOL. PENETRATION #221 (CIV)	Butterfly	Man / Motor
12	ETY006VA	CONT. ISOL. PENETRATION #222 (CIV)	Butterfly	Man / Motor
12	ETY007VA	CONT. ISOL. PENETRATION #304 (CIV)	Butterfly	Man / Motor
12	ETY008VA	CONT. ISOL. PENETRATION #352 (CIV)	Butterfly	Man / Motor
12	ETY009VA	CONT. ISOL. PENETRATION #304 (CIV)	Butterfly	Air / Motor
12	ETY010VA	CONT. ISOL. PENETRATION #352 (CIV)	Butterfly	Air / Motor
12	ETY042VA	CONT. ISOL. PENETRATION #230a (CIV)	Globe	Air
12	ETY043VA	CONT. ISOL. PENETRATION #230a (CIV)	Globe	Air
12	ETY044VA	CONT. ISOL. PENETRATION #230b (CIV)	Globe	Air
12	ETY045VA	CONT. ISOL. PENETRATION #230b (CIV)	Globe	Air
12	ETY049VA	TEST CONNECTION FOR CONT. PENETRATION #221 (CIV)	Globe	Manual
12	ETY050VA	TEST CONNECTION FOR CONT. PENETRATION #222 (CIV)	Globe	Manual

Unit/s	Equipment	Description	Type	Action Type
12	ETY051VA	TEST CONNECTION FOR CONT. PENETRATION #304 (CIV)	Globe	Manual
12	ETY052VA	TEST CONNECTION FOR CONT. PENETRATION #352 (CIV)	Globe	Manual
12	ETY059VA	TEST CONNECTION FOR CONT. PENETRATION #230a (CIV)	Globe	Manual
12	ETY060VA	TEST CONNECTION FOR CONT. PENETRATION #230b (CIV)	Globe	Manual
12	ETY073VA	TEST CONNECTION FOR CONT. PENETRATION # 226(CIV)	Globe	Manual
12	ETY074VA	TEST CONNECTION FOR CONT. PENETRATION #406 (CIV)	Globe	Manual
12	ETY081VA	TEST CONNECTION FOR CONT. PENETRATION #223 (CIV)	Globe	Manual
12	ETY220VA	TEST CONNECTION FOR CONT. PENETRATION #407 (CIV)	Globe	Manual
12	ETY221VA	TEST CONNECTION FOR CONT. PENETRATION #407 (CIV)	Globe	Manual
12	GCT128VV	001 GV ATMOSPHERIC BY-PASS ISOL.	Gate	Motor
12	GCT129VV	002 GV ATMOSPHERIC BY-PASS ISOL.	Gate	Motor
12	GCT130VV	003 GV ATMOSPHERIC BY-PASS ISOL.	Gate	Motor
12	GCT131VV	001 GV ATMOSPHERIC BY-PASS	Globe	Air
12	GCT132VV	002 GV ATMOSPHERIC BY-PASS	Globe	Air
12	GCT133VV	003 GV ATMOSPHERIC BY-PASS	Globe	Air
12	JPI054VE	TEST CONNECTION FOR CONT. PENETRATION #203c (CIV)	Globe	Manual
12	JPI070VE	CONT. ISOL. PENETRATION #203c (CIV)	Globe	Manual
12	JPI071VE	CONT. ISOL. PENETRATION #203c NRV (CIV)	Swing NRV	Self
12	PTR001PO	Spent Fuel Pit Circulation Pump	Pump	C-H
12	PTR002PO	Spent Fuel Pit Circulation Pump	Pump	C-H
12	PTR004VB	PTR 002 PO DISCHARGE NRV	Swing NRV	Self
12	PTR005VB	PTR 001 PO DISCHARGE NRV	Swing NRV	Self
12	PTR006PO	Spent Fuel Pit Circulation Pump (PTR 3rd Train)	Pump	C-H
12	PTR021VB	CONT. ISOLATION PENETRATION #213 (CIV)	Gate	Manual
12	PTR022VB	CONT. ISOLATION PENETRATION #213 (CIV)	Gate	Manual
12	PTR023VB	CONT. ISOLATION PENETRATION #213 NRV (CIV)	Lift NRV	Self
12	PTR129VB	CONT. ISOLATION PENETRATION #220a (CIV)	Gate Wedge	Manual
12	PTR130VB	CONT. ISOLATION PENETRATION #220a NRV (CIV)	Swing NRV	Self
12	PTR140VB	CONT. ISOLATION PENETRATION #219a (CIV)	Gate	Manual
12	PTR141VB	CONT. ISOLATION PENETRATION #219a (CIV)	Gate	Manual
12	PTR145VB	CONT. ISOLATION PENETRATION #220b (CIV)	Gate	Manual
12	PTR146VB	CONT. ISOLATION PENETRATION #220b (CIV)	Gate	Manual
12	PTR170VB	CONT. ISOLATION PENETRATION #220b NRV (CIV)	Lift NRV	Self
12	PTR171VB	CONT. ISOLATION PENETRATION #219a NRV (CIV)	Lift NRV	Self
12	PTR328VB	PTR 006 PO DISCHARGE NRV (PTR 3rd train)	Swing NRV	Self
12	PTR403VB	DRAIN VALVE CONNECTION FOR CONT. PEN #220a (CIV)	Globe	Manual
12	PTR406VB	DRAIN VALVE CONNECTION FOR CONT. PEN #219a (CIV)	Globe	Manual
12	PTR530VB	TEST CONNECTION FOR CONT. PENETRATION #220a (CIV)	Globe	Manual
12	RAZ009VZ	N2 TO ACCUM CONT. ISOL. PENETRATION #231b (CIV)	Globe	Air
12	RAZ010VZ	N2 TO ACCUM CONT. ISOL. PENETRATION #231b NRV (CIV)	Lift NRV	Self
12	RAZ032VZ	N2 TO RCP 002 BA CONT. ISOL. PENETRATION #231a (CIV)	Globe	Air
12	RAZ034VZ	N2 TO RCP 002 BA CONT. ISOL. PENETRATION #231a (CIV)	Lift NRV	Self
12	RAZ402VZ	TEST CONNECTION FOR CONT. PENETRATION #231b (CIV)	Globe	Manual

Unit/s	Equipment	Description	Type	Action Type
12	RAZ405VZ	TEST CONNECTION FOR CONT. PENETRATION 231a	Globe	Manual
12	RAZ905VZ	RIS ACC VENT CONT. ISOL. PENETRATION #406 (CIV)	Globe	Manual
12	RCP005VP	PRESSURIZER POWER OP. RELIEF VALVE ISOL. (PIV)	Gate	Motor
12	RCP006VP	PRESSURIZER POWER OP. RELIEF VALVE ISOL. (PIV)	Gate	Motor
12	RCP007VP	PRESSURIZER POWER OP RELIEF VALVE ISOL. (PIV)	Gate	Motor
12	RCP008VP	PRESSURIZER RELIEF VALVE	Globe	Air
12	RCP009VP	PRESSURIZER RELIEF VALVE	Globe	Air
12	RCP010VP	PRESSURIZER RELIEF VALVE	Globe	Air
12	RCP011VP	PRESSURIZER NO. 1 SAFETY	Relief	Self
12	RCP012VP	PRESSURIZER NO. 2 SAFETY	Relief	Self
12	RCP013VP	PRESSURIZER NO. 3 SAFETY	Relief	Self
12	RCP036VP	PRESSURIZER AUX. SPRAY NRV	Lift NRV	Self
12	RCP120VP	RIS TO LOOP 1 HOT LEG NRV (PIV)	Swing NRV	Self
12	RCP121VP	RIS ACCUMULATOR TO LOOP 1 NRV (PIV)	Swing NRV	Self
12	RCP122VP	RIS TO LOOP 1 COLD LEG NRV (PIV)	Swing NRV	Self
12	RCP130VP	SEAL INJECTION 001 PO NRV	Lift NRV	Self
12	RCP212VP	LOOP 2 HOT LEG TO RRA (PIV)	Gate	Motor
12	RCP215VP	LOOP 2 HOT LEG TO RRA (PIV)	Gate	Motor
12	RCP220VP	RIS TO LOOP 2 HOT LEG (PIV)	Swing NRV	Self
12	RCP221VP	RIS ACCUMULATOR TO LOOP 2 (PIV)	Swing NRV	Self
12	RCP222VP	RIS TO LOOP 2 COLD LEG (PIV)	Swing NRV	Self
12	RCP223VP	RCV TO LOOP 2 COLD LEG	Swing NRV	Self
12	RCP230VP	SEAL INJECTION TO 002 PO	Lift NRV	Self
12	RCP320VP	RIS TO LOOP 3 HOT LEG (PIV)	Swing NRV	Self
12	RCP321VP	RIS ACCUMULATOR TO LOOP 3 (PIV)	Swing NRV	Self
12	RCP322VP	RIS TO LOOP 3 COLD LEG (PIV)	Swing NRV	Self
12	RCP330VP	SEAL INJECTION TO 003PO	Lift NRV	Self
12	RCV001PO	Chemical and Volume Control Charging Pump	Pump	C-H
12	RCV002PO	Chemical and Volume Control Charging Pump	Pump	C-H
12	RCV002VP	RCV LETDOWN ISOLATION	Globe	Air
12	RCV003PO	Chemical and Volume Control Charging Pump	Pump	C-H
12	RCV003VP	RCV LETDOWN ISOLATION	Globe	Air
12	RCV007VP	RCV LETDOWN CONT. ISOL. PENETRATION #255 (CIV)	Globe	Air
12	RCV008VP	RCV LETDOWN CONT. ISOL. PENETRATION #255 (CIV)	Globe	Air
12	RCV009VP	RCV LETDOWN CONT. ISOL. PENETRATION #255 (CIV)	Globe	Air
12	RCV010VP	RCV LETDOWN CONT. ISOL. PENETRATION #255 CIV)	Globe	Air
12	RCV033VP	VOLUME CONTROL TANK ISOLATION	Gate	Motor
12	RCV034VP	VOLUME CONTROL TANK ISOLATION	Gate	Motor
12	RCV035VP	VOLUME CONTROL TANK TO RCV PUMPS NRV	Swing NRV	Self
12	RCV039VP	RCV 001 PO DISCHARGE NRV	Swing NRV	Self
12	RCV040VP	RCV 002 PO DISCHARGE NRV	Swing NRV	Self
12	RCV041VP	RCV 003 PO DISCHARGE NRV	Swing NRV	Self
12	RCV048VP	CHARGING LINE CONT. ISOLATION PEN #260 (CIV)	Gate	Motor

Unit/s	Equipment	Description	Type	Action Type
12	RCV049VP	CHARGING LINE CONT. ISOLATION PEN #260 (CIV)	Swing NRV	Self
12	RCV050VP	CHARGING FLOW ISOLATION	Gate	Motor
12	RCV051VP	CHARGING FLOW ISOLATION NRV	Swing NRV	Self
12	RCV052VP	AUX. SPRAY ISOLATION NRV	Lift NRV	Self
12	RCV053VP	RCV PUMP SUCTION ISOLATION	Gate	Motor
12	RCV054VP	RCV PUMP SUCTION ISOLATION	Gate	Motor
12	RCV070VP	SEAL INJECT CONT. ISOLATION PENETRATION #257 (CIV)	Lift NRV	Self
12	RCV071VP	SEAL INJECT CONT. ISOLATION PENETRATION #256 (CIV)	Lift NRV	Self
12	RCV072VP	SEAL INJECT CONT. ISOLATION PENETRATION #259 (CIV)	Lift NRV	Self
12	RCV076VP	SEAL INJECT CONT. ISOLATION PENETRATION #257 (CIV)	Globe	Motor
12	RCV077VP	SEAL INJECT CONT. ISOLATION PENETRATION #256 (CIV)	Globe	Motor
12	RCV078VP	SEAL INJECT CONT. ISOLATION PENETRATION #259 (CIV)	Globe	Motor
12	RCV082VP	RRA TO RCV CONT. ISOLATION PENETRATION #255 (CIV)	Globe	Air
12	RCV083VP	RCV PUMP DISCHARGE CROSSOVER	Gate	Motor
12	RCV084VP	RCV PUMP DISCHARGE CROSSOVER	Gate	Motor
12	RCV085VP	RCV PUMP DISCHARGE CROSSOVER	Gate	Motor
12	RCV086VP	RCV PUMP DISCHARGE CROSSOVER	Gate	Motor
12	RCV088VP	SEAL RETURN CONT. ISOLATION PENETRATION #258 (CIV)	Gate	Motor
12	RCV089VP	SEAL RETURN CONT. ISOLATION PENETRATION #258 (CIV)	Gate	Motor
12	RCV114VP	PROTECTION FOR RCV 002 BA	Relief	Self
12	RCV130VP	REA TO RCV PUMP SUCTION NRV	Lift NRV	Self
12	RCV201VP	LETDOWN RELIEF VALVE CONT. ISOL. PENETRATION #255 (CIV)	Relief	Self
12	RCV203VP	PROTECTION FOR AVL RCV 013 VP	Relief	Self
12	RCV214VP	PROTECTION FOR RCV 002 BA	Relief	Self
12	RCV216VP	RCV 001 PO MINIFLOW NRV	Lift NRV	Self
12	RCV217VP	RCV 002 PO MINIFLOW NRV	Lift NRV	Self
12	RCV218VP	RCV 003 PO MINIFLOW NRV	Lift NRV	Self
12	RCV222VP	RCV PUMP MINIFLOW ISOLATION	Gate	Motor
12	RCV223VP	RCV PUMP MINIFLOW ISOLATION	Gate	Motor
12	RCV224VP	PROTECTION FOR RCV 003 RF	Relief	Self
12	RCV252VP	NO 1 SEAL WATER RETURN LINE	Relief	Self
12	RCV253VP	SEAL RETURN CONT ISOLATION PENETRATION #258 (CIV)	Lift NRV	Self
12	RCV367VP	RCV TO RRA CONT. ISOLATION PENETRATION #214 (CIV)	Gate	Manual
12	RCV368VP	RCV TO RRA CONT. ISOLATION PENETRATION #214 (CIV)	Swing NRV	Self
12	RCV373VP	RCV PUMP VENTING ISOLATION	Globe	Air
12	RCV374VP	RCV PUMP VENTING ISOLATION	Globe	Air
12	RCV375VP	RCV PUMP VENTING ISOLATION	Globe	Air
12	RCV376VP	RCV PUMP VENTING ISOLATION	Globe	Air
12	RCV404VP	DRAIN VALVE FOR PENETRATION #260 (CIV)	Globe	Manual
12	RCV409VP	DRAIN VALVE FOR PENETRATION #257 (CIV)	Globe	Manual
12	RCV412VP	DRAIN VALVE FOR PENETRATION #256 (CIV)	Globe	Manual
12	RCV415VP	DRAIN VALVE FOR PENETRATION #259 (CIV)	Globe	Manual
12	RCV419VP	DRAIN VALVE FOR PENETRATION #214 (CIV)	Globe	Manual

Unit/s	Equipment	Description	Type	Action Type
12	RCV887VP	MANUAL BYPASS FOR 12 RCV 048 VP PENETRATION #260(CIV)	Globe	Manual
12	RCV905VP	ISOL FROM PTR TANK (SBO mod 96074)	Gate	Motor
12	RCV910VP	NRV to seal injection (SBO mod 96074)	Swing NRV	Self
12	RCV911VP	NRV to seal injection (SBO mod 96074)	Swing NRV	Self
12	RCV918VP	NRV to seal injection (SBO mod 96074)	Swing NRV	Self
12	REA003PO	Boric Acid Pump	Pump	C-H
12	REA004PO	Boric Acid Pump	Pump	C-H
12	REA056VB	REA 003 PO DISCHARGE NRV	Lift NRV	Self
12	REA057VB	REA 004 PO DISCHARGE NRV	Lift NRV	Self
12	REA130VD	MAKE-UP TO RCP PUMPS CONT. ISOL. PENETRATION #220c(CIV)	Globe	Air
12	REA131VD	MAKE-UP TO RCP PUMPS CONT. ISOL. PENETRATION #220c(CIV)	Swing NRV	Self
12	REA210VB	REA SYSTEM EMERGENCY BORATION	Globe	Motor
12	REA401VD	TEST CONNECTION FOR CONT. PENETRATION #220c (CIV)	Globe	Manual
12	REN101VP	RCP TO REN CONT. ISOL. PENETRATION #271b (CIV)	Globe	Air
12	REN102VP	RCP TO REN CONT. ISOL. PENETRATION #271a (CIV)	Globe	Air
12	REN103VP	RCP TO REN CONT. ISOL. PENETRATION #271b (CIV)	Globe	Air
12	REN104VP	RCP TO REN CONT. ISOL. PENETRATION #271a (CIV)	Globe	Air
12	REN121VP	RCP TO REN CONT. ISOL. PENETRATION #270a (CIV)	Globe	Air
12	REN122VP	RRA TO REN CONT. ISOL. PENETRATION #270a (CIV)	Globe	Air
12	REN123VP	RCP 001 BA LIQUID CONT. ISOL. PENETRATION #270b (CIV)	Globe	Air
12	REN124VP	RRA TO REN CONT. ISOL. PENETRATION 270b (CIV)	Globe	Air
12	REN131VP	CONT. ISOLATION PENETRATION #270a (CIV)	Globe	Air
12	REN132VP	REN CONT. ISOLATION PENETRATION #270b (CIV)	Globe	Air
12	REN161VB	ACCUM. #1 TO FUME CONT. ISOL. PENETRATION #250c (CIV)	Globe	Air
12	REN162VB	ACCUM. #2 TO FUME CONT. ISOL. PENETRATION #270c (CIV)	Globe	Air
12	REN163VB	ACCUM. #3 TO FUME CONT. ISOL. PENETRATION #271c (CIV)	Globe	Air
12	REN164VB	ACCUM. #1 TO FUME CONT. ISOL. PENETRATION #250c (CIV)	Globe	Air
12	REN165VB	ACCUM. #2 TO FUME CONT. ISOL. PENETRATION #270c (CIV)	Globe	Air
12	REN166VB	ACCUM. #3 TO FUME CONT. ISOL. PENETRATION #271c (CIV)	Globe	Air
12	REN185VL	ARE TO REN CONT. ISOL. PENETRATION #301a	Globe	Air
12	REN186VL	ARE TO REN CONT. ISOL. PENETRATION #301b	Globe	Air
12	REN187VL	ARE TO REN CONT. ISOL. PENETRATION #301c	Globe	Air
12	REN191VL	APG TO REN CONT. ISOL. PENETRATION #301a	Globe	Air
12	REN192VL	APG TO REN CONT. ISOL. PENETRATION #301b	Globe	Air
12	REN193VL	APG TO REN CONT. ISOL. PENETRATION #301c	Globe	Air
12	REN194VL	REN CONT. ISOL. PENETRATION #301a	Globe	Air
12	REN195VL	REN CONT. ISOL. PENETRATION #301b	Globe	Air
12	REN196VL	REN CONT. ISOL. PENETRATION #301c	Globe	Air
12	REN231VY	RCP 002 BA TO FUME CONT. ISOL. PENETRATION #250b (CIV)	Globe	Air
12	REN232VY	RCP 002 BA TO FUME CONT. ISOL. PENETRATION #250b (CIV)	Globe	Air
12	REN235VY	GAS FUME TO RPE CONT. ISOL. PENETRATION #250a (CIV)	Globe	Air
12	REN236VY	GAS FUME TO RPE CONT. ISOL. PENETRATION #250a (CIV)	Globe	Air
12	RIS001PO	Low Head Safety Injection Pump	Pump	VLS

Unit/s	Equipment	Description	Type	Action Type
12	RIS001VP	ACCUMULATOR #1 TO RCP LOOP #1	Gate	Motor
12	RIS002PO	Low Head Safety Injection Pump	Pump	VLS
12	RIS002VP	ACCUMULATOR #2 TO RCP LOOP #2	Gate	Motor
12	RIS003VP	ACCUMULATOR #3 TO RCP LOOP #3	Gate	Motor
12	RIS004VP	ACCUMULATOR #1 TO LOOP #1 NRV(PIV)	Swing NRV	Self
12	RIS005VP	ACCUMULATOR #2 TO LOOP #2 NRV(PIV)	Swing NRV	Self
12	RIS006VP	ACCUMULATOR #3 TO LOOP #3 NRV(PIV)	Swing NRV	Self
12	RIS011VP	PTR TO HHSI PUMP NRV	Swing NRV	Self
12	RIS012VP	PTR TO HHSI PUMP	Gate	Motor
12	RIS013VP	PTR TO HHSI PUMP	Gate	Motor
12	RIS017VP	PTR TO HHSI PUMP NRV	Swing NRV	Self
12	RIS020VP	HHSI TO COLD LEGS CONT. ISOL PENETRATION #262 (CIV)	Gate	Motor
12	RIS021VP	HHSI TO HOT LEGS CONT. ISOL. PENETRATION #263 (CIV)	Gate	Motor
12	RIS022VP	HHSI TO HOT LEGS CONT. ISOL. PEN NRV #263 (CIV)	Swing NRV	Self
12	RIS032VP	HHSI TO RIS 004 BA ISOLATION	Gate	Motor
12	RIS033VP	HHSI TO RIS 004 BA ISOLATION	Gate	Motor
12	RIS034VP	RIS 004 BA TO COLD LEGS CONT ISOL PENETRATION #266(CIV)	Gate	Motor
12	RIS035VP	RIS 004 BA TO COLD LEGS CONT ISOL PENETRATION #266(CIV)	Gate	Motor
12	RIS040VP	HHSI TO COLD LEGS CONT. ISOL. PEN NRV #266(CIV)	Lift NRV	Self
12	RIS041VP	HHSI TO COLD LEGS CONT. ISOL. PEN NRV #266(CIV)	Lift NRV	Self
12	RIS042VP	HHSI TO COLD LEGS CONT. ISOL. PEN NRV #266(CIV)	Lift NRV	Self
12	RIS051VP	CONT. SUMP TO LHSI CONT. ISOL. PENETRATION #105(CIV)	Gate	Motor
12	RIS052VP	CONT. SUMP TO LHSI CONT. ISOL. PENETRATION #103(CIV)	Gate	Motor
12	RIS053VP	CONT. SUMP TO LHSI PUMP NRV	Swing NRV	Self
12	RIS054VP	CONT. SUMP TO LHSI PUMP NRV	Swing NRV	Self
12	RIS057VP	LHSI PUMP RIS 001 PO DISCH NRV	Swing NRV	Self
12	RIS058VP	LHSI PUMP RIS 002 PO DISCH NRV	Swing NRV	Self
12	RIS061VP	LHSI TO COLD LEGS CONT. ISOL. PENETRATION #104 (CIV)	Gate	Motor
12	RIS062VP	LHSI TO COLD LEGS CONT. ISOL. PENETRATION #207 (CIV)	Gate	Motor
12	RIS063VP	LHSI TO HOT LEGS CONT. ISOL. PENETRATION #102 (CIV)	Gate	Motor
12	RIS064VP	LHSI TO HOT LEGS CONT. ISOL. PENETRATION #101 (CIV)	Gate	Motor
12	RIS069VP	LHSI TO HOT LEGS CONT. ISOL. PEN NRV #102 (CIV/PIV)	Swing NRV	Self
12	RIS070VP	LHSI TO HOT LEGS CONT. ISOL. PEN NRV #101 (CIV/PIV)	Swing NRV	Self
12	RIS071VP	LHSI TO COLD LEGS CONT. ISOL. PEN NRV #104 (CIV)	Swing NRV	Self
12	RIS072VP	LHSI TO COLD LEGS LOOP #1 NRV (PIV)	Swing NRV	Self
12	RIS073VP	LHSI TO COLD LEGS LOOP #2 NRV (PIV)	Swing NRV	Self
12	RIS074VP	LHSI TO COLD LEGS LOOP #3 NRV (PIV)	Swing NRV	Self
12	RIS075VB	PTR TO LHSI PUMP RIS 001PO	Gate	Motor
12	RIS076VP	PTR TO LHSI PUMP RIS 001PO NRV	Swing NRV	Self
12	RIS077VP	LHSI TO HHSI SUCTION	Gate	Motor
12	RIS078VP	LHSI TO HHSI SUCTION	Gate	Motor
12	RIS081VP	LHSI TO COLD LEGS CONT. ISOL. PEN NRV #207 (CIV)	Swing NRV	Self
12	RIS085VB	PTR TO LHSI PUMP RIS 002 PO	Gate	Motor

Unit/s	Equipment	Description	Type	Action Type
12	RIS086VP	PTR TO LHSI PUMP RIS 002 PO NRV	Swing NRV	Self
12	RIS091VP	POVIS ISOLATION	Globe	Air
12	RIS092VP	POVIS ISOLATION	Globe	Air
12	RIS093VP	POVIS ISOLATION	Globe	Air
12	RIS102VZ	PROTECTION FOR RIS 001 BA	Relief	Self
12	RIS104VZ	PROTECTION FOR RIS 002 BA	Relief	Self
12	RIS106VZ	PROTECTION FOR RIS 003 BA	Relief	Self
12	RIS122VP	ACCUM. TEST LINE CONT. ISOL. PENETRATION #220d (CIV)	Globe	Air
12	RIS124VP	ACCUM. TEST LINE CONT. ISOL. PENETRATION #220d (CIV)	Globe	Air
12	RIS128VP	PROTECTS RIS 001 PO	Relief	Self
12	RIS129VP	PROTECTS RIS 002 PO	Relief	Self
12	RIS132VP	LHSI RIS 001 PO TO MINIFLOW LINE	Gate	Motor
12	RIS133VP	LHSI RIS 002 PO TO MINIFLOW LINE	Gate	Motor
12	RIS136VB	PTR TO ACCUM. CONT. ISOL. PENETRATION #254a(CIV)	Globe	Air
12	RIS137VB	PTR TO ACCUM. CONT. ISOL. PENETRATION #254a NRV (CIV)	Lift NRV	Self
12	RIS144VP	LHSI 001 PO TO MINIFLOW LINE	Gate	Motor
12	RIS145VP	LHSI 002 PO TO MINIFLOW LINE	Gate	Motor
12	RIS205VP	RIS 004 BA RECIRC. LINE ISOL. NRV	Lift NRV	Self
12	RIS206VP	RIS 004 BA RECIRC. LINE ISOL.	Globe	Air
12	RIS208VP	RIS 004 BA RECIRC. LINE ISOL.	Globe	Air
12	RIS209VP	RIS 004 BA RECIRC. LINE ISOL.	Globe	Air
12	RIS215VP	PROTECTS RIS 004 BA	Relief	Self
12	RIS287VP	RIS 004 BA BYPASS CONT. ISOL. PENETRATION #266 (CIV)	Globe	Manual
12	RIS361VP	HHSI TO COLD LEGS CONT. ISOL PENETRATION #262 (CIV)	Globe	Air
12	RIS362VP	HHSI TO COLD LEGS CONT. ISOL PENETRATION #263(CIV)	Globe	Air
12	RIS363VP	HHSI TO COLD LEGS ISOL VALVE (CP1 mod 02275)	Globe	Air
12	RIS401VP	TEST CONNECTION FOR CONT. PENETRATION #266 (CIV)	Globe	Manual
12	RIS408VP	TEST CONNECTION FOR CONT. PENETRATION #263 (CIV)	Globe	Manual
12	RIS412VP	TEST CONNECTION FOR CONT. PENETRATION #207 (CIV)	Globe	Manual
12	RIS414VP	TEST CONNECTION FOR CONT. PENETRATION #101 (CIV)	Globe	Manual
12	RIS417VP	TEST CONNECTION FOR CONT. PENETRATION #102 (CIV)	Globe	Manual
12	RIS421VP	TEST CONNECTION FOR CONT. PENETRATION #104 (CIV)	Globe	Manual
12	RIS423VB	TEST CONNECTION FOR CONT. PENETRATION #254a (CIV)	Globe	Manual
12	RIS531VP	TEST CONNECTION FOR CONT. PENETRATION #266 (CIV)	Globe	Manual
12	RIS532VP	TEST CONNECTION FOR CONT. PENETRATION #266 (CIV)	Globe	Manual
12	RIS620VP	TEST CONNECTION FOR CONT. PENETRATION #103 (CIV)	Globe	Manual
12	RIS621VP	TEST CONNECTION FOR CONT. PENETRATION #105 (CIV)	Globe	Manual
12	RIS869VP	MANUAL BYPASS FOR 12 RIS 020 VP PENETRATION #262(CIV)	Globe	Manual
12	RIS870VP	MANUAL BYPASS FOR 12 RIS 063 VP PENETRATION #102(CIV)	Globe	Manual
12	RIS871VP	MANUAL BYPASS FOR 12 RIS 064 VP PENETRATION #101(CIV)	Globe	Manual
12	RPE002VY	H2 VENT CONT. ISOL. PENETRATION #254b (CIV)	Globe	Air
12	RPE003VY	H2 VENT CONT. ISOL. PENETRATION #254b (CIV)	Globe	Air
12	RPE017VP	REAC COOLANT DRAIN CONT. ISOL. PENETRATION #264 (CIV)	Globe	Air

Unit/s	Equipment	Description	Type	Action Type
12	RPE018VP	REAC COOLANT DRAIN CONT. ISOL. PENETRATION #264 (CIV)	Globe	Air
12	RPE027VP	PROCESS DRAIN CONT. ISOL. PENETRATION #268 (CIV)	Globe	Air
12	RPE028VP	PROCESS DRAIN CONT. ISOL. PENETRATION #268 (CIV)	Globe	Air
12	RPE055VE	FLOOR DRAIN CONT. ISOL. PENETRATION #269 (CIV)	Globe	Air
12	RPE056VE	FLOOR DRAIN CONT. ISOL. PENETRATION #269 (CIV)	Globe	Air
12	RPE405VP	TEST CONNECTION FOR CONT. PENETRATION #268 (CIV)	Globe	Manual
12	RRA001PO	Residual Heat Removal Pump	Pump	C-H
12	RRA001VP	RRA PUMP SUCTION ISOLATION (PIV)	Gate	Motor
12	RRA002PO	Residual Heat Removal Pump	Pump	C-H
12	RRA004VP	RRA 001 PO DISCHARGE NRV	Swing NRV	Self
12	RRA005VP	RRA 002 PO DISCHARGE NRV	Swing NRV	Self
12	RRA014VP	RRA TO LOOP 1 COLD LEG ISOL(PIV)	Gate	Motor
12	RRA015VP	RRA TO LOOP 3 COLD LEG ISOL(PIV)	Gate	Motor
12	RRA018VP	PROTECTS LINES BETWEEN 001PO	Relief	Self
12	RRA021VP	RRA PUMP SUCTION ISOLATION(PIV)	Gate	Motor
12	RRA115VP	AND 002 PO TO 001RF AND 002RF	Relief	Self
12	RRI001PO	Nuclear Component Cooling Water Pump	Pump	C-H
12	RRI002PO	Nuclear Component Cooling Water Pump	Pump	C-H
12	RRI003PO	Nuclear Component Cooling Water Pump	Pump	C-H
12	RRI004PO	Nuclear Component Cooling Water Pump	Pump	C-H
12	RRI005VN	RRI 001 PO DISCHARGE NRV	Swing NRV	Self
12	RRI006VN	RRI 002 PO DISCHARGE NRV	Swing NRV	Self
12	RRI007VN	RRI 003 PO DISCHARGE NRV	Swing NRV	Self
12	RRI008VN	RRI 004 PO DISCHARGE NRV	Swing NRV	Self
12	RRI011VN	RRI TO RRA CONT. ISOL. PENETRATION #217 (CIV)	Gate	Manual
12	RRI012VN	RRI TO RRA CONT. ISOL. PENETRATION #218 (CIV)	Gate	Manual
12	RRI013VN	RRI TO RRA CONT. ISOL. PEN NRV #217 (CIV)	Swing NRV	Self
12	RRI014VN	RRI TO RRA CONT. ISOL. PEN NRV #218 (CIV)	Swing NRV	Self
12	RRI019VN	RRI FROM RRA CONT. ISOL. PENETRATION #215 (CIV)	Gate	Motor
12	RRI020VN	RRI FROM RRA CONT. ISOL. PENETRATION #216 (CIV)	Gate	Motor
12	RRI021VN	RRI FROM RRA CONT. ISOL. PENETRATION #215 (CIV)	Gate	Manual
12	RRI022VN	RRI FROM RRA CONT. ISOL. PENETRATION #216 (CIV)	Gate	Manual
12	RRI035VN	RRI FROM EAS 001 RF	Butterfly	Air
12	RRI036VN	RRI FROM EAS 002 RF	Butterfly	Air
12	RRI040VN	EXCHANGERS SUPPLY TRAIN B	Butterfly	Motor
12	RRI041VN	EXCHANGERS SUPPLY TRAIN A	Butterfly	Motor
12	RRI058VN	EXCHANGERS SUPPLY TRAIN A	Butterfly	Motor
12	RRI059VN	EXCHANGERS SUPPLY TRAIN B	Butterfly	Motor
12	RRI130VN	RRA 002 RF**	Relief	Self
12	RRI131VN	RRA 001 RF**	Relief	Self
12	RRI146VN	RRI TO DEG ISOL. VALVE	Gate	Motor
12	RRI170VN	RRI TO RRM RF CONT. ISOL. PENETRATION #212 (CIV)	Gate	Motor
12	RRI177VN	RRI FROM RRM RF CONT. ISOL. PENETRATION #211(CIV)	Gate	Motor

Unit/s	Equipment	Description	Type	Action Type
12	RRI188VN	RRI TO RRM RF CONT. ISOL. PEN NRV #212 (CIV)	Swing NRV	Self
12	RRI189VN	RRI FROM RRM RF CONT. ISOL. PENETRATION #211(CIV)	Gate	Motor
12	RRI209VN	RCV 002 RF DOWNSTREAM**	Relief	Self
12	RRI210VN	RRI TO RCP 001 PO CONT. ISOL. PENETRATION #201a(CIV)	Gate	Motor
12	RRI211VN	RRI TO RCP 002 PO CONT. ISOL. PENETRATION #201b(CIV)	Gate	Motor
12	RRI212VN	RRI TO RCP 003 PO CONT. ISOL. PENETRATION #210(CIV)	Gate	Motor
12	RRI213VN	RRI TO RCP 001 PO CONT. ISOL. PEN NRV #201a(CIV)	Swing NRV	Self
12	RRI214VN	RRI TO RCP 002 PO CONT. ISOL. PEN NRV #201b(CIV)	Swing NRV	Self
12	RRI215VN	RRI TO RCP 003 P0 CONT. ISOL. PEN NRV #210(CIV)	Swing NRV	Self
12	RRI219VN	RRI TO RCP 001 PO THERMAL BARRIER NRV	Lift NRV	Self
12	RRI220VN	RRI TO RCP 002 PO THERMAL BARRIER NRV	Lift NRV	Self
12	RRI221VN	RRI TO RCP 003 PO THERMAL BARRIER NRV	Lift NRV	Self
12	RRI225VN	RRI FROM RCP 001 PO THERMAL BARRIER	Globe	Air
12	RRI226VN	RRI FROM RCP 002 PO THERMAL BARRIER	Globe	Air
12	RRI227VN	RRI FROM RCP 003 PO THERMAL BARRIER	Globe	Air
12	RRI280VN	RRI FROM RCP 001 PO CONT. ISOL. PENETRATION #202a(CIV)	Gate	Motor
12	RRI281VN	RRI FROM RCP 002 PO CONT. ISOL. PENETRATION # 202b(CIV)	Gate	Motor
12	RRI282VN	RRI FROM RCP 003 PO CONT. ISOL. PENETRATION #209 (CIV)	Gate	Motor
12	RRI283VN	RRI FROM RCP 001 PO CONT. ISOL. PENETRATION #202a (CIV)	Gate	Motor
12	RRI284VN	RRI FROM RCP 002 PO CONT. ISOL. PENETRATION #202b (CIV)	Gate	Motor
12	RRI285VN	RRI FROM RCP 003 PO CONT. ISOL. PENETRATION #209 (CIV)	Gate	Motor
12	RRI300VN	RRI TO RCP 002 BA CONT. ISOL. PENETRATION #208a(CIV)	Gate	Motor
12	RRI304VN	RRI FROM RCP 002 BA CONT. ISOL. PENETRATION #208b(CIV)	Globe	Motor
12	RRI313VN	RRI FROM RCP 021 RF CONT. ISOL. PENETRATION #208c(CIV)	Gate	Motor
12	RRI317VN	PROTECTS RCV 021 RF**	Relief	Self
12	RRI318VN	RRI FROM RCP 002 BA CONT. ISOL. PENETRATION #208b(CIV)	Globe	Motor
12	RRI319VN	RRI FROM RCV 021 RF CONT. ISOL. PENETRATION #208c(CIV)	Gate	Motor
12	RRI320VN	RRI TO RCP 002 BA CONT. ISOL. PEN NRV #208a (CIV)	Swing NRV	Self
12	RRI330VN	PROTECTS PTR 004 RF**	Relief	Self
12	RRI335VN	RRM RF DOWNSTREAM**	Relief	Self
12	RRI465VN	NON ESSENTIAL EXCHANGER ISOLATION	Butterfly	Man / Motor
12	RRI466VN	NON ESSENTIAL EXCHANGER ISOLATION	Butterfly	Man / Motor
12	RRI476VN	RRI FROM RCP001PO CONT. ISOL. PEN NRV #202a (CIV)	Lift NRV	Self
12	RRI477VN	RRI FROM RCP002BA CONT. ISOL. PEN NRV #202b(CIV)	Lift NRV	Self
12	RRI478VN	RRI FROM RCP 003 PO CONT. ISOL. PEN NRV #209(CIV)	Lift NRV	Self
12	RRI479VN	RRI FROM RCP002BA CONT. ISOL. PEN NRV #208b (CIV)	Lift NRV	Self
12	RRI480VN	RRI FROM RCP021RF CONT. ISOL. PEN NRV #208c (CIV)	Lift NRV	Self
12	RRI481VN	RRI FROM RRM RF CONT. ISOL. PEN NRV #211 (CIV)	Lift NRV	Self
12	RRI539VN	RRI FROM RRA RF CONT. ISOL. PEN NRV #215 (CIV)	Lift NRV	Self
12	RRI540VN	RRI FROM RRA RF CONT. ISOL. PEN NRV #216 (CIV)	Lift NRV	Self
12	RRI551VN	RRI TO DEG ISOLATION	Butterfly	Motor
12	RRI552VN	RRI FROM DEG NRV	Swing NRV	Self

Unit/s	Equipment	Description	Type	Action Type
12	RRI685VN	RCP 001 PO THERMAL BARRIER	Relief	Self
12	RRI686VN	RCP 002 PO THERMAL BARRIER	Relief	Self
12	RRI687VN	RCP 003 PO THERMAL BARRIER	Relief	Self
12	RRI725VN	RRI 07.11 RF - RRI 001 PO**	Relief	Self
12	RRI726VN	RRI 06.12 RF - RRI 002 PO**	Relief	Self
12	RRI727VN	RRI 09.13 RF - RRI 003 PO**	Relief	Self
12	RRI728VN	RRI 08.14 RF - RRI 004 PO**	Relief	Self
12	RRI729VN	PROTECTS EAS 001 RF**	Relief	Self
12	RRI730VN	PROTECTS EAS 002 RF**	Relief	Self
12	RRI731VN	PROTECTS DVH 001 RF**	Relief	Self
12	RRI732VN	PROTECTS DVH 002 RF**	Relief	Self
12	RRI733VN	PROTECTS PTR 001 RF**	Relief	Self
12	RRI734VN	PROTECTS PTR 002 RF**	Relief	Self
12	RRI735VN	PROTECTS RCV 003 RF**	Relief	Self
12	RRI751VN	TEST CONNECTION FOR CONT. PENETRATION #217 (CIV)	Globe	Manual
12	RRI752VN	TEST CONNECTION FOR CONT. PENETRATION #218 (CIV)	Globe	Manual
12	RRI757VN	TEST CONNECTION FOR CONT. PENETRATION #215 (CIV)	Globe	Manual
12	RRI758VN	TEST CONNECTION FOR CONT. PENETRATION #216 (CIV)	Globe	Manual
12	RRI761VN	TEST CONNECTION FOR CONT. PENETRATION #201a (CIV)	Globe	Manual
12	RRI762VN	TEST CONNECTION FOR CONT. PENETRATION #201b (CIV)	Globe	Manual
12	RRI763VN	TEST CONNECTION FOR CONT. PENETRATION #210 (CIV)	Globe	Manual
12	RRI767VN	TEST CONNECTION FOR CONT. PENETRATION #202a (CIV)	Globe	Manual
12	RRI768VN	TEST CONNECTION FOR CONT. PENETRATION #202b (CIV)	Globe	Manual
12	RRI769VN	TEST CONNECTION FOR CONT. PENETRATION #209 (CIV)	Globe	Manual
12	RRI773VN	TEST CONNECTION FOR CONT. PENETRATION #208a (CIV)	Globe	Manual
12	RRI777VN	TEST CONNECTION FOR CONT. PENETRATION #208c (CIV)	Globe	Manual
12	RRI778VN	TEST CONNECTION FOR CONT. PENETRATION #208b (CIV)	Globe	Manual
12	RRI781VN	TEST CONNECTION FOR CONT. PENETRATION #212 (CIV)	Globe	Manual
12	RRI784VN	TEST CONNECTION FOR CONT. PENETRATION #211 (CIV)	Globe	Manual
12	SAR432VA	INSTRUMENT AIR CONT. ISOL. PENETRATION #203a(CIV)	Globe	Motor
12	SAR433VA	INSTRUMENT AIR CONT. ISOL. PEN NRV #203a(CIV)	Lift NRV	Self
12	SAR579VA	TEST CONNECTION FOR CONT. PENETRATION #203a (CIV)	Globe	Manual
12	SAT052VA	SERVICE AIR CONT. ISOL. PENETRATION #203b(CIV)	Globe	Manual
12	SAT053VA	SERVICE AIR CONT. ISOL. PENETRATION #203b(CIV)	Globe	Manual
12	SAT401VA	TEST CONNECTION FOR CONT. PENETRATION #203b (CIV)	Globe	Manual
12	SEC001PO	Essential Service Water Pump	Pump	C-V
12	SEC002PO	Essential Service Water Pump	Pump	C-V
12	SEC003PO	Essential Service Water Pump	Pump	C-V
12	SEC004PO	Essential Service Water Pump	Pump	C-V
12	SEC005PO	Wash Water Pumps	Pump	C-H
12	SEC005VE	SEC 001 PO DISCHARGE NRV	NRV	Self
12	SEC006PO	Wash Water Pumps	Pump	C-H
12	SEC006VE	SEC 002 PO DISCHARGE NRV	NRV	Self

Unit/s	Equipment	Description	Type	Action Type
12	SEC007PO	Wash Water Pumps	Pump	C-H
12	SEC007VE	SEC 003 PO DISCHARGE NRV	NRV	Self
12	SEC008PO	Wash Water Pumps	Pump	C-H
12	SEC008VE	SEC 004 PO DISCHARGE NRV	NRV	Self
12	SEC023VE	SEC 005 PO DISCHARGE NRV	NRV	Self
12	SEC024VE	SEC 006 PO DISCHARGE NRV	NRV	Self
12	SEC025VE	SEC 007 PO DISCHARGE NRV	NRV	Self
12	SEC026VE	SEC 008 PO DISCHARGE NRV	NRV	Self
12	SEC037VE	WASH WATER TO 001 FI	Butterfly	Air
12	SEC038VE	WASH WATER TO 002 FI	Butterfly	Air
12	SEC089VA	VACUUM BREAKER 001RF OUTLET	NRV	Self
12	SEC090VA	VACUUM BREAKER 002RF OUTLET	NRV	Self
12	SED200VD	DEMIN WATER CONT. ISOL. PENETRATION #219b(CIV)	Globe	Manual
12	SED201VD	DEMIN WATER CONT. ISOL. PENETRATION #219b(CIV)	Lift NRV	Self
12	SED401VD	TEST CONNECTION FOR CONT. PENETRATION #219b (CIV)	Globe	Manual
12	SIR039VR	CHEM REAGENT PENETRATION # 232a		
12	SIR040VR	CHEM REAGENT PENETRATION # 232b		
12	SIR041VR	CHEM REAGENT PENETRATION #232c		
12	SIR042VR	CHEM REAGENT PENETRATION #232a NRV		
12	SIR043VR	CHEM REAGENT PENETRATION #232b NRV		
12	SIR044VR	CHEM REAGENT PENETRATION #232c NRV		
12	VVP001VV	MAIN STEAM 001 GV ISOLATION PISTON	Globe	Air
12	VVP002VV	MAIN STEAM 002 GV ISOLATION PISTON	Globe	Air
12	VVP003VV	MAIN STEAM 003 GV ISOLATION PISTON	Globe	Air
12	VVP100VV	MTRZD SAFETY VALVE #1 ON SG 01	Relief	Air Assist
12	VVP101VV	MTRZD SAFETY VALVE #1 ON SG 02	Relief	Air Assist
12	VVP102VV	MTRZD SAFETY VALVE #1 ON SG 03	Relief	Air Assist
12	VVP103VV	MTRZD SAFETY VALVE #2 ON SG 01	Relief	Air Assist
12	VVP104VV	MTRZD SAFETY VALVE #2 ON SG 02	Relief	Air Assist
12	VVP105VV	MTRZD SAFETY VALVE #2 ON SG 03	Relief	Air Assist
12	VVP106VV	SAFETY VALVE #3 ON SG 01	Relief	Self
12	VVP107VV	SAFETY VALVE #3 ON SG 02	Relief	Self
12	VVP108VV	SAFETY VALVE #3 ON SG 03	Relief	Self
12	VVP109VV	SAFETY VALVE #4 ON SG 01	Relief	Self
12	VVP110VV	SAFETY VALVE #4 ON SG 02	Relief	Self
12	VVP111VV	SAFETY VALVE #4 ON SG 03	Relief	Self
12	VVP112VV	MTRZD SAFETY VALVE #5 ON SG 01	Relief	Air Assist
12	VVP113VV	MTRZD SAFETY VALVE #5 ON SG 02	Relief	Air Assist
12	VVP114VV	MTRZD SAFETY VALVE #5 ON SG 03	Relief	Air Assist
12	VVP115VV	SAFETY VALVE #6 ON SG 01	Relief	Self
12	VVP116VV	SAFETY VALVE #6 ON SG 02	Relief	Self
12	VVP117VV	SAFETY VALVE #6 ON SG 03	Relief	Self
12	VVP118VV	SAFETY VALVE #7 ON SG 01	Relief	Self

Unit/s	Equipment	Description	Type	Action Type
12	VVP119VV	SAFETY VALVE #7 ON SG 02	Relief	Self
12	VVP120VV	SAFETY VALVE #7 ON SG 03	Relief	Self
12	VVP127VV	001 GV MAIN STEAM TO ASG	Globe	Air
12	VVP128VV	002 GV MAIN STEAM TO ASG	Globe	Air
12	VVP129VV	003 GV MAIN STEAM TO ASG	Globe	Air
12	VVP140VV	VVP 001 VV BYPASS	Globe	Air
12	VVP141VV	VVP 002 VV BYPASS	Globe	Air
12	VVP142VV	VVP 003 VV BYPASS	Globe	Air
1	PTR533VB	TEST CONNECTION FOR CONT. PENETRATION #220b (CIV)	Globe	Manual
1	RCV506VP	TEST CONNECTION FOR CONT. PENETRATION #258 (CIV)	Globe	Manual
1	RCV509VP	TEST CONNECTION FOR CONT. PENETRATION #257 (CIV)	Globe	Manual
1	RCV523VP	TEST CONNECTION FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
1	RCV545VP	TEST CONNECTION FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
1	RCV546VP	TEST CONNECTION FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
1	RCV547VP	TEST CONNECTION FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
1	RCV550VP	TEST CONNECTION FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
1	RCV581VP	TEST CONNECTION FOR CONT. PENETRATION #259 (CIV)	Globe	Manual
1	REA534VD	TEST CONNECTION FOR CONT. PENETRATION #220c (CIV)	Globe	Manual
1	REN540VP	DRAIN VALVE FOR CONT. PENETRATION #270b(CIV)	Globe	Manual
1	REN546VP	DRAIN VALVE FOR CONT. PENETRATION #270a (CIV)	Globe	Manual
1	REN547VB	TEST CONNECTION FOR CONT. PENETRATION #271c (CIV)	Globe	Manual
1	RIS410VP	TEST CONNECTION FOR CONT. PENETRATION #263 (CIV)	Globe	Manual
1	RIS533VP	DRAIN VALVE FOR CONT. PENETRATION #266 (CIV)	Globe	Manual
1	RIS550VP	TEST CONNECTION FOR CONT. PENETRATION #220d (CIV)	Globe	Manual
1	SED521VD	TEST CONNECTION FOR CONT. PENETRATION #219b (CIV)	Globe	Manual
2	PTR537VB	TEST CONNECTION VALVE FOR CONT. PEN #220b (CIV)	Globe	Manual
2	RCV517VP	DRAIN VALVE FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
2	RCV556VP	DRAIN VALVE FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
2	RCV589VP	DRAIN VALVE FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
2	RCV592VP	DRAIN VALVE FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
2	RCV593VP	TEST CONNECTION FOR CONT. PENETRATION #257 (CIV)	Globe	Manual
2	RCV594VP	TEST CONNECTION FOR CONT. PENETRATION #258 (CIV)	Globe	Manual
2	RCV597VP	DRAIN VALVE FOR CONT. PENETRATION #255 (CIV)	Globe	Manual
2	REN538VP	TEST CONNECTION FOR CONT. PENETRATION #270b (CIV)	Globe	Manual
2	REN539VY	DRAIN VALVE FOR CONT. PENETRATION #250a (CIV)	Globe	Manual
2	REN540VP	DRAIN VALVE FOR CONT. PENETRATION #250b (CIV)	Globe	Manual
2	REN541VP	DRAIN VALVE FOR CONT. PENETRATION #270a (CIV)	Globe	Manual
2	RIS555VP	DRAIN VALVE FOR CONT. PENETRATION #266 (CIV)	Globe	Manual

Appendix B – Emergency Diesel Generators (EDGs) Components

COMPONENTS	DESCRIPTION
12 LHP 001 PO	
12 LHQ 001 PO	
9 LHS 001 PO	Fuel Transfer Pumps
12 LHP 002 PO	
12 LHQ 002 PO	
9 LHS 002 PO	Fuel Transfer Pumps
12 LHP 003 PO	
12 LHQ 003 PO	
9 LHS 003 PO	Fuel Electrical Pump
12 LHP 007 PO	
12 LHQ 007 PO	
9 LHS 007 PO	Fuel engine- driven pump
12 LHP 006 PO	
12 LHQ 006 PO	
9 LHS 006 PO	Backup hand pump to 003 PO
12 LHP 014 PO	
12 LHQ 014 PO	
9 LHS 014 PO	
12 LHP 001 VF	
12 LHQ 001 VF	
9 LHS 001 VF	
12 LHP 002 VF	
12 LHQ 002 VF	
9 LHS 002 VF	
12 LHP 013 VF	
12 LHQ 013 VF	
9 LHS 013 VF	
12 LHP 014 VF	
12 LHQ 014 VF	
9 LHS 014 VF	
12 LHP 018 VF	
12 LHQ 018 VF	
9 LHS 018 VF	
12 LHP 019 VF	
12 LHQ 019 VF	
9 LHS 019 VF	
12 LHP 020 VF	
12 LHQ 020 VF	
9 LHS 020 VF	Backup pump to 001 and 002 POs

12 LHP 023 VF	
12 LHQ 023 VF	
9 LHS 023 VF	
12 LHP 021 VF	
12 LHQ 021 VF	
9 LHS 021 VF	
12 LHP 024 VF	
12 LHQ 024 VF	
9 LHS 024 VF	
12 LHP 032 VF	
12 LHQ 032 VF	
9 LHS 032 VF	
12 LHP 033 VF	
12 LHQ 033 VF	
9 LHS 033 VF	
12 LHP 030 VF	
12 LHQ 030 VF	
9 LHS 030 VF	
12 LHP 031 VF	
12 LHQ 031 VF	
9 LHS 031 VF	
12 LHP 035VF	
12 LHQ 035 VF	
9 LHS 035 VF	
12 LHP 034 VF	manual valve - bypass solenoid valve 006EL - suction 003 PO
12 LHQ 034 VF	manual valve - bypass solenoid valve 006EL - suction 003 PO
9 LHS 034 VF	manual valve - bypass solenoid valve 006EL - suction 003 PO
12 LHP 039 VF	relief valve - 003 PO
12 LHQ 039 VF	relief valve - 003 PO
9 LHS 039 VF	relief valve - 003 PO
12 LHP 040 VF	manual valve - isolation pump discharge 003 PO
12 LHQ 040 VF	manual valve - isolation pump discharge 003 PO
9 LHS 040 VF	manual valve - isolation pump discharge 003 PO
12 LHP 041 VF	check valve - pump discharge 003 PO
12 LHQ 041 VF	check valve - pump discharge 003 PO
9 LHS 041 VF	check valve - pump discharge 003 PO
12 LHP 049 VF	check valve - fuel return line - SKID
12 LHQ 049 VF	check valve - fuel return line - SKID
9 LHS 049 VF	check valve - fuel return line - SKID
12 LHP 042 VF	check valve - discharge 007 PO - SKID

12 LHQ 042 VF	check valve - discharge 007 PO - SKID
9 LHS 042 VF	check valve - discharge 007 PO - SKID
12 LHP 046 VF	check valve - discharge 007 PO - SKID
12 LHQ 046 VF	check valve - discharge 007 PO - SKID
9 LHS 046 VF	check valve - discharge 007 PO - SKID
12 LHP 047 VF	relief valve - discharge 003 PO - SKID
12 LHQ 047 VF	relief valve - discharge 003 PO - SKID
9 LHS 047 VF	relief valve - discharge 003 PO - SKID
12 LHP 043 VF	relief valve - 007PO - SKID
12 LHQ 043 VF	relief valve - 007PO - SKID
9 LHS 043 VF	relief valve - 007PO - SKID
12 LHP 036 VF	manual valve - isolation suction 006 PO
12 LHQ 036 VF	manual valve - isolation suction 006 PO
9 LHS 036 VF	manual valve - isolation suction 006 PO
12 LHP 037 VF	check valve - discharge 006 PO
12 LHQ 037 VF	check valve - discharge 006 PO
9 LHS 037 VF	check valve - discharge 006 PO
12 LHP 015 / 053 VF	manual valves - suction 014 PO
12 LHQ 015 / 053 VF	manual valves - suction 014 PO
9 LHS 015 / 053 VF	manual valves - suction 014 PO
12 LHP 045 / 022 VF	manual valves - suction 014 PO
12 LHQ 045 / 022 VF	manual valves - suction 014 PO
9 LHS 045 / 022 VF	manual valves - suction 014 PO
12 LHP 013 PO	LT water engine- driven pump - SKID
12 LHQ 013 PO	LT water engine- driven pump - SKID
9 LHS 013 PO	LT water engine- driven pump - SKID
12 LHP 011 PO	LT water engine- driven pump - SKID
12 LHQ 011 PO	LT water engine- driven pump - SKID
9 LHS 011 PO	LT water engine- driven pump - SKID
12 LHP 008 PO	LT water engine- driven pump - SKID
12 LHQ 008 PO	LT water engine- driven pump - SKID
9 LHS 008 PO	LT water engine- driven pump - SKID
12 LHP 017 VC	check valve - discharge 011 PO - SKID
12 LHQ 017 VC	check valve - discharge 011 PO - SKID
9 LHS 017 VC	check valve - discharge 011 PO - SKID
12 LHP 016 VC	check valve - discharge 008 PO
12 LHQ 016 VC	check valve - discharge 008 PO
9 LHS 016 VC	check valve - discharge 008 PO
12 LHP 004PO	Preheating Oil and Water Pump
12 LHQ 004 PO	Preheating Oil and Water Pump

9 LHS 004 PO	Preheating Oil and Water Pump
12 LHP 009PO	direct engine driven pump LHJ 009 PO - SKID
12 LHQ 009 PO	direct engine driven pump LHJ 009 PO - SKID
9 LHS 009 PO	direct engine driven pump LHJ 009 PO - SKID
12 LHP 017 VH	check valve - heater outlet 001 EX
12 LHQ 017 VH	check valve - heater outlet 001 EX
9 LHS 017 VH	check valve - heater outlet 001 EX
12 LHP 018 VH	manual valve - Preheat Pump Suction 004PO
12 LHQ 018 VH	manual valve - Preheat Pump Suction 004PO
9 LHS 018 VH	manual valve - Preheat Pump Suction 004PO
12 LHP 020 VH	relief valve - preheat oil pump 004PO
12 LHQ 020 VH	relief valve - preheat oil pump 004PO
9 LHS 020 VH	relief valve - preheat oil pump 004PO
12 LHP 021 VH	oil pressure relief valve - SKID
12 LHQ 021 VH	oil pressure relief valve - SKID
9 LHS 021 VH	oil pressure relief valve - SKID
12 LHP 022 VH	oil pressure relief valve - SKID
12 LHQ 022 VH	oil pressure relief valve - SKID
9 LHS 022 VH	oil pressure relief valve - SKID
12 LHP 014 VH	manual valve - filling from tank 006BA - SKID
12 LHQ 014 VH	manual valve - filling from tank 006BA - SKID
9 LHS 014 VH	manual valve - filling from tank 006BA - SKID
12 LHP 009 VA	manual valve - isolation inlet 001 BA
12 LHQ 009 VA	manual valve - isolation inlet 001 BA
9 LHS 009 VA	manual valve - isolation inlet 001 BA
12 LHP 010 VA	manual valve - isolation inlet 002 BA
12 LHQ 010 VA	manual valve - isolation inlet 002 BA
9 LHS 010 VA	manual valve - isolation inlet 002 BA
12 LHP 013 VA	check valve inlet 001 BA
12 LHQ 013 VA	check valve inlet 001 BA
9 LHS 013 VA	check valve inlet 001 BA
12 LHP 014 VA	check valve inlet 002 BA
12 LHQ 014 VA	check valve inlet 002 BA
9 LHS 014 VA	check valve inlet 002 BA
12 LHP 015 VA	manual valve - isolation outlet to 001 BA
12 LHQ 015 VA	manual valve - isolation outlet to 001 BA
9 LHS 015 VA	manual valve - isolation outlet to 001 BA
12 LHP 016 VA	manual valve - isolation outlet to 002 BA
12 LHQ 016 VA	manual valve - isolation outlet to 002 BA
9 LHS 016 VA	manual valve - isolation outlet to 002 BA

12 LHP 029 VA	relief valve - 001 BA
12 LHQ 029 VA	relief valve - 001 BA
9 LHS 029 VA	relief valve - 001 BA
12 LHP 030 VA	relief valve - 002 BA
12 LHQ 030 VA	relief valve - 002 BA
9 LHS 030 VA	relief valve - 002 BA
12 LHP 017 VA	check valve - governor servo motor - SKID (NOT INCL in Classification document)
12 LHQ 017 VA	check valve - governor servo motor - SKID (NOT INCL in Classification document)
9 LHS 017 VA	check valve - governor servo motor - SKID (NOT INCL in Classification document)
12 LHP 018 VA	check valve -starting air1 - SKID
12 LHQ 018 VA	check valve -starting air1 - SKID
9 LHS 018 VA	check valve -starting air1 - SKID
12 LHP 019 VA	check valve -stopping air - SKID
12 LHQ 019 VA	check valve -stopping air - SKID
9 LHS 019 VA	check valve -stopping air - SKID
12 LHP 020 VA	manual valve
12 LHQ 020 VA	manual valve
9 LHS 020 VA	manual valve
12 LHP 021 VA	check valve -fuel pipe purge - SKID
12 LHQ 021 VA	check valve -fuel pipe purge - SKID
9 LHS 021 VA	check valve -fuel pipe purge - SKID
12 LHP 024 VA	check valve -fuel pipe purge - SKID
12 LHQ 024 VA	check valve -fuel pipe purge - SKID
9 LHS 024 VA	check valve -fuel pipe purge - SKID
12 LHP 031 VA	relief valve - stopping air rack position - SKID
12 LHQ 031 VA	relief valve - stopping air rack position - SKID
9 LHS 031 VA	relief valve - stopping air rack position - SKID
12 LHP 035 VA	solenoid valve - pneumatic starter - SKID
12 LHQ 035 VA	solenoid valve - pneumatic starter - SKID
9 LHS 035 VA	solenoid valve - pneumatic starter - SKID
12 LHP 036 VA	solenoid valve - pneumatic starter - SKID
12 LHQ 036 VA	solenoid valve - pneumatic starter - SKID
9 LHS 036 VA	solenoid valve - pneumatic starter - SKID
12 LHP 037 VA	solenoid valve - normal and emergency stop 030EL
12 LHQ 037 VA	solenoid valve - normal and emergency stop 030EL
9 LHS 037 VA	solenoid valve - normal and emergency stop 030EL
12 LHP 051 VA	pressure reducing - stopping air - SKID
12 LHQ 051 VA	pressure reducing - stopping air - SKID
9 LHS 051 VA	pressure reducing - stopping air - SKID
12 LHP 053 VA	solenoid valve governor starter line - SKID

12 LHQ 053 VA	solenoid valve governor starter line - SKID
9 LHS 053 VA	solenoid valve governor starter line - SKID
12 LHP 078 VA	Pressure relief valve for the manifold
12 LHQ 078 VA	Pressure relief valve for the manifold
12 LHS 078 VA	Pressure relief valve for the manifold
12 LHP 082 VA	Air Start distributor
12 LHQ 082 VA	Air Start distributor
12 LHS 082 VA	Air Start distributor