R11298341

RIVER PROTECTION PROJECT – WASTE TREATMENT PLANT

ENGINEERING SPECIFICATION

ISSUED BY RPP-WTP PDC

FOR

HLW HOP & PJV HEPA Filter Preheaters

Content applicable to ALARA? ☒ Yes ☐ No

ADR No.
24590-HLW-ADR-M-04-0002

Rev
2

Specification changes retroactive? ☒ Yes ☐ No ☐ N/A (alpha revision or revision 0)

NOTE: Contents of this document are Dangerous Waste Permit affecting.

Quality Level
Q
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REV	DATE	BY	CHECK	REVIEW	E&NS	DPEM/EM
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SPECIFICATION No.
24590-HLW-3PS-MEE0-T0001

Rev
1

Revision History

Revision	Reason for Revision
0	Issued for purchase. Changed test requirements in para. 6.3.5 from hydrostatic to pneumatic leak, deleted requirements for Seller to determine radiation shielding requirements, added requirement for environmental qualification per 24590-WTP-3PS-JQ06-T0005.
1	Re-issued for purchase. This revision includes, but is not limited to: 1) Editorial/clarification changes throughout. 2) Updated Section 1.4: Acronyms, Abbreviations and Definitions. 3) Added Air Permit reference to Section 1.5. 4) Updated and added references to Section 2.2: Codes and Standards 5) Updated and added references to Section 2.3: Reference Documents/Drawings. 6) Incorporated the following SDDR's by reference, Section 2.4: • 24590-WTP-SDDR-PROC-05-00069 • 24590-WTP-SDDR-PROC-05-00140 • 24590-WTP-SDDR-PROC-05-00142 • 24590-WTP-SDDR-PROC-05-00143 • 24590-WTP-SDDR-PROC-05-00148 7) Revised and updated Section 3 to incorporate additional scope and better define design and performance requirements. 8) Incorporated the following SDDR's with Design Changes: • 24590-WTP-SDDR-PROC-05-00144: Revised Section 3.11.1. • 24590-WTP-SDDR-PROC-05-00150: Revised Section 1.2.5. • 24590-WTP-SDDR-PROC-05-00151: Revised Section 3.7.6. 9) Incorporated the following SCN's: • 24590-HLW-3PN-MEE0-00001: Deleted Section 3.6.2 and 3.7.3. Incorporated change as new Sections 3.4.5 and 3.4.6. • 24590-HLW-3PN-MEE0-00002: Added new Section 3.3.13; revised Sections 3.10.1, 3.10.4, and 3.10.5. • 24590-HLW-3PN-MEE0-00004: Revised Section 1.2.5; added new Section 2.4; revised Sections 3.3.8 and 3.3.10; deleted Section 2.3.12 and revised Section 3.7.6; revised Sections 3.7.8 and 3.7.10; revised electrical isolation requirement as new Section 3.7.14; deleted Section 2.3.13 and revised Section 3.11.1; revised Section 4.1.4; deleted Section 6.3.6 and incorporated change as new Section 3.2.6. • 24590-HLW-3PN-MEE0-00005: Revised Section 3.9.2. • 24590-WTP-3PN-M000-00037: Added note for "Dangerous Waste Permit affecting".

Revision	Reason for Revision
	10) Implemented 24590-WTP-GRCN-ENG-09-0008: removed reference to QA general specification 24590-WTP-3PS-G000-T0001; deleted Sections 8.1.1, 8.1.2, 8.2.1, and 8.2.4.; added Sections 8.2.5 and 8.2.6. 11) Deleted Sections 2.2.7, 2.2.8, 2.3.3, 2.3.15, and 10.2.1. 12) Added new Sections 1.3.5, 2.1.3, 2.1.4, 4.1.8, 4.2.6, 5.2.5, 6.3.10, 7.3.2, 10.2.2, 10.2.3, and 10.4. 13) Added Appendices (A thru D) and updated Table of Contents.

DOE Radioactive Materials Disclaimer :

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the US Department of Energy (DOE) facilities exclusively by DOE acting pursuant to its AEA authority. DOE asserts, that pursuant to the AEA, it has sole and exclusive responsibility and authority to regulate source, special nuclear, and byproduct materials at DOE-owned nuclear facilities. Information contained herein on radionuclides is provided for process description purposes only.

Contents

Appendices

1 Scope

1.1 Project Description and Location

The Hanford Tank Waste Treatment and Immobilization Plant (WTP) is a complex of waste treatment facilities where the US Department of Energy (DOE) Hanford Site tank waste will be pretreated and immobilized into a stable glass form via vitrification. The WTP contractor will design, build, and start up the WTP pretreatment and vitrification facilities for the DOE Office of River Protection.

The Hanford Site occupies an area of about 560 square miles along the Columbia River, north of Richland, WA, in the USA. The WTP facilities will be constructed at the 200 East Area of the Hanford Site. The site elevation varies from 662 feet to 684 feet above mean sea level.

1.2 Equipment, Material, and Services Required

This specification establishes the minimum requirements for the performance, design, analysis, materials, fabrication, testing, inspection, quality assurance, qualification, documentation, and preparation for shipment of High Efficiency Particulate Air (HEPA) Filter Preheaters for the Melter Offgas Treatment Process System (HOP) and Pulse Jet Ventilation System (PJV) in the High-Level Waste (HLW) facility.

The scope of work for the Seller includes all work defined in this specification, its addenda, and attachments. The scope of work for the Seller shall include, but is not limited to, the following:

1.2.1 Provide design, materials, fabrication, testing, qualification, inspection, preparation for shipment, documentation, and submittals of HEPA Filter Preheaters (hereafter known as the "Preheaters") in accordance with this specification and its addenda, the Mechanical Data Sheets (MDS), Equipment Qualification Datasheets (EQD), purchasing documents, and referenced codes, standards, and documents.

1.2.2 Provide a breakdown (by paragraph) of the codes, standards, and referenced documents to be applied to each aspect of design, drawings, analyses, fabrication, quality assurance, inspection, testing, qualification, labeling, packaging, handling, and shipment of the Preheaters for review prior to beginning of detailed design. If an entire section or part of the listed codes and standards applies, a breakdown by paragraph is not required. Only the part or section shall be listed.

1.2.3 Each Preheater shall include, but is not limited to, the following:

- An in-cast liner
- A mounting frame
- A plenum with an inlet nozzle, an outlet nozzle, and heating element thermowells
- Electric heating elements
- Preheater control system
- Local control panel
- Temperature sensor thermowells (two each for inlet and outlet nozzles, one for the housing)
- Steel plating for radiation shielding
- Thermal insulation and insulation support lugs

1.2.4 Provide instructions for transportation, storage, handling, and installation of the Preheaters per Seller's recommendations and the requirements of this specification.

1.2.5 Packaging of the in-cast liner, plenum, shielding plates, and other bulk/structural steel parts shall be sufficient to allow for outdoor storage for a period of up to one (1) year at the WTP site (See Section 3.4.1 of this specification). Packaging of the power and controls components shall meet the requirements of ASME NQA-2-1989, *Quality Assurance Requirements for Nuclear Facility Applications*, Part 2.2, for Level B protection.

1.2.6 Provide and submit procedures, reports, manuals, and all documentation per this specification, and Forms G-321-E and G-321-V of the Material Requisition (MR).

1.2.7 Provide operating and maintenance manuals.

1.2.8 Each Preheater shall be assembled and wired to the fullest extent in the shop, requiring minimum assembly, installation, and connection to Buyer's piping, electrical power supply, and control interface.

1.2.9 Code stamp and National Board registration for the Preheaters are not required, unless otherwise noted in this specification.

1.3 Work by Others

Any item not specifically listed as being supplied by the Buyer shall be provided by the Seller. The Buyer shall supply the following:

1.3.1 Transportation of the Preheaters to the Buyer's premises .

1.3.2 Handling, storage, and installation of the Preheaters at the Buyer's job site.

1.3.3 Electric power to the Preheaters.

1.3.4 External wiring and cabling to the Preheaters.

1.3.5 Field testing of the Preheaters to ASME AG-1 Section TA.

1.4 Acronyms, Abbreviations and Definitions

1.4.1 Acronyms and Abbreviations

ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
CFR	Code of Federal Regulations
CMTR	Certified Material Test Report
DBE	Design Basis Events
DOE	US Department of Energy
EQ	Equipment Qualification
EQD	Equipment Qualification Datasheet

HEPA	High Efficiency Particulate Air
HLW	High-Level Waste
HOP	Melter Offgas Treatment Process System
ICN	Integrated Control Network
ISRS	In-Structure Response Spectra
ITS	Important To Safety
IEEE	Institute of Electrical and Electronics Engineers
MDS	Mechanical Data Sheet
MR	Material Requisition
MTBF	Mean Time Between Failure
MTTF	Mean Time to Failure
MTTR	Mean Time to Repair
NPT	National Pipe Thread
NQA	Quality Assurance Program Requirements for Nuclear Facilities
PJV	Pulse Jet Ventilation System
PMI	Positive Material Identification
PPJ	Programmable Protection System
QA	Quality Assurance
QAP	Quality Assurance Program
SC	Safety Class
SDDR	Supplier Deviation Disposition Request
SS	Safety Significant
SSC	Structure, System, or Component
UL	Underwriters Laboratories, Inc.
WTP	Hanford Tank Waste Treatment and Immobilization Plant

1.4.2 Definitions

Buyer: Bechtel National Inc.

Seller: This term includes manufacturer, assembler, fabricator, supplier, vendor, contractor, sub-contractor, sub-supplier or equal who provides equipment, systems, components, services, or other products for delivery to the Buyer.

Preheaters: Refers to the High Efficiency Particulate Air (HEPA) Filter Preheaters.

MR: Refers to the material requisition for the Preheaters.

MDS: Refers to the mechanical data sheet for the Preheaters.

EQD: Refers to the equipment qualification datasheet included in the MDS for the Preheaters.

C2: Contamination classification for plant areas that are normally uncontaminated but have the potential to be contaminated. Equipment and personnel are confirmed to be uncontaminated before exit to uncontrolled areas.

C5: Contamination classification for plant areas that are considered high contamination areas. Personnel access to C5 areas is not normally permitted.

R2: Radiation classification for areas with a target dose equivalent rate of 0.250 mrem/hr. It is a controlled area with no limit on occupancy for general employees subject to compliance with basic procedures.

R5: Radiation classification for areas considered high or very high radiation areas. Personnel access to R5 areas is not normally permitted.

Design Basis Events (DBE): Postulated events providing bounding conditions for establishing the performance requirements of Safety equipment. The Design Basis Events also establish the performance requirements of the equipment whose failure under Design Basis Event conditions could adversely affect the function of Safety equipment.

DBEs include natural phenomena hazard (NPH) events. NPH events applicable to WTP are seismic, straight wind, wind-driven missile, snow, snow loading, ashfall, ashfall loading, and temperature extremes.

Safety equipment: Equipment that are necessary to: (1) ensure the integrity of the safety boundaries protecting the worker (2) place and maintain the facility in a safe state or (3) prevent or mitigate the event consequences so that the radiological exposures to the general public or the workers do not exceed established limits.

Safety-class structures, systems, and components (SC SSC): The structures, systems, or components, including portions of process systems, whose preventive or mitigative function is necessary to limit radioactive hazardous material exposure to the public, as determined from safety analyses. SC SSC is also designated as Important To Safety (ITS).

Safety-significant structures, systems, and components (SS SSC): The structures, systems, and components which are not designated as safety-class structures, systems, and components, but whose preventative or mitigative function is a major contributor to defense and/or worker safety as determined from safety analyses. SS SSC is also designated as ITS.

1.5 Quality Level

The quality level identifies the quality requirements to be applied to the equipment. Quality requirements are specifically defined on the associated mechanical data sheets (MDS) and supplier quality assurance program requirements data sheets. Structures, Systems, and Components identified as SC, SS and/or Air Permit affecting are Quality Level "Q" items. Refer to the MDSs for the quality level designations of the Preheaters.

1.6 Seismic Category

Specific requirements for the designated seismic categories are defined in 24590-WTP-3PS-SS90-T0001, *Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks.* Refer to the MDSs and EQDs for the seismic category designations of the Preheaters.

2 Applicable Documents

2.1 General

2.1.1 Work shall be done in accordance with the referenced codes, standards, and documents listed below, which are an integral part of this specification.

2.1.2 When specific chapters, sections, parts, or paragraphs are listed following a code, industry standard, or reference document, only those chapters, sections, parts, or paragraphs of the document are applicable and shall be applied. If a date or revision is not listed in Section 2, the latest issue, including addenda, at the time of request for quote shall apply. For material standards, if a later edition of the listed standard is required, the Seller shall obtain approval by SDDR prior to use of the material.

2.1.3 The effective dates and revisions listed in Section 2 shall apply to all subsequent references to codes and standards within this specification.

2.1.4 When more than one code, standard, or referenced document covers the same topic, the requirements for all must be met with the most stringent governing.

2.2 Codes and Standards

2.2.1 10 CFR 835, *Occupational Radiation Protection.*

2.2.2 Deleted.

2.2.3 ANSI/AISC N690-1994, *Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities - Tailored.* See Appendix B of this specification.

2.2.4 ASME AG-1-1997 with AG-1-a-2000 Addenda, Sections AA, CA and TA, *Code on Nuclear Air and Gas Treatment - Tailored.* See Appendix C of this specification.

2.2.5 ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, *Rules for Construction of Pressure Vessels.*

2.2.6 ASME NQA-1-1989, *Quality Assurance Program Requirements for Nuclear Facilities.*

2.2.7 Deleted.

2.2.8 Deleted.

2.2.9 ASTM E-119, *Standard Test Methods for Fire Tests of Building Construction and Materials.*

2.2.10 ASME NQA-2-1989, *Quality Assurance Requirements for Nuclear Facility Applications.*

2.2.11 ASME Boiler and Pressure Vessel Code, Section V, *Nondestructive Examination.*

2.2.12 ASME Boiler and Pressure Vessel Code, Section IX, *Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators.*

2.2.13 ASME Boiler and Pressure Vessel Code, Section II, *Materials.*

2.2.14 ASME Code for Pressure Piping, B31.3-1996, *Process Piping.*

2.2.15 ASME Y14.100, *Engineering Drawing Practices.*

2.2.16 IEEE 384-1992, *Standard Criteria for Independence of Class 1E Equipment and Circuits - Tailored.* See Appendix D of this specification.

2.2.17 UL 499, Underwriters Laboratories Inc., *Electric Heating Appliances*

2.2.18 UL 834, Underwriters Laboratories Inc., *Heating, Water Supply, and Power Boilers - Electric*

2.3 Reference Documents/Drawings

2.3.1 24590-WTP-3PS-AFPS-T0001, *Engineering Specification for Shop Applied Special Protective Coatings for Steel Items and Equipment*

2.3.2 24590-WTP-3PS-EKP0-T0001, *Engineering Specification for Electrical Requirements for Packaged Equipment*

2.3.3 Deleted

2.3.4 24590-WTP-3PS-G000-T0002, *Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication*

2.3.5 24590-WTP-3PS-G000-T0003, *Engineering Specification for Packaging, Handling, and Storage Requirements*

2.3.6 24590-WTP-3PS-JQ06-T0003, *Engineering Specification for Seismic Qualification of Seismic Category I Control and Electrical Systems and Components*

2.3.7 24590-WTP-3PS-JQ07-T0001, *Engineering Specification for Instrumentation for Package Systems*

2.3.8 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication*

2.3.9 24590-WTP-3PS-MVB2-T0001, *Engineering Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers*

2.3.10 24590-WTP-3PS-NN00-T0001, *Engineering Specification for Thermal Insulation for Mechanical Systems*

2.3.11 24590-WTP-3PS-SS90-T0001, *Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks*

2.3.12 Deleted.

2.3.13 Deleted.

2.3.14 24590-WTP-3PS-JQ06-T0005, *Engineering Specification for Environmental Qualification of Control and Electrical Systems and Components*

2.3.15 Deleted.

2.3.16 24590-WTP-3PS-G000-T0014, *Engineering Specification for Supplier Design Analyses*

2.3.17 24590-WTP-3PS-G000-T0015, *Engineering Specification for Environmental Qualification of Mechanical Equipment*

2.3.18 24590-WTP-3PS-MV00-T0002, *Engineering Specification for Seismic Qualification Criteria for Pressure Vessels*

2.3.19 24590-WTP-3PS-MV00-T0003, *Engineering Specification for Pressure Vessel Fatigue Analysis*

2.3.20 24590-WTP-3PS-PX04-T0004, *Engineering Specification for Epoxy Coating of Stainless Steel Items That Are Buried, Embedded or Insulated*

2.3.21 24590-WTP-DC-ST-01-001, *Structural Design Criteria*

2.3.22 24590-WTP-3PS-P000-T0001, *Engineering Specification for Piping Material Classes General Description and Summary*

2.3.23 24590-WTP-3PB-P000-TS11V, *Piping Material Classification Pipe Class S11V*

2.3.24 24590-WTP-3PB-P000-TS11Z, *Piping Material Classification Pipe Class S11Z*

2.3.25 24590-WTP-3PB-P000-TN11F, *Piping Material Classification Pipe Class N11F*

2.3.26 24590-HLW-P1-P23T-00208, *HLW Vitrification Building Equipment Location Plan EL. 14'-0"/ Area 208*

2.3.27 24590-HLW-DB-S13T-00054, *HLW Vitrification Building Structural Concrete Forming Partial Plan EL 14'-0" Area 4*

2.3.28 24590-HLW-DB-S13T-00057, *HLW Vitrification Building Structural Concrete Forming Partial Plan EL 14'-0" Area 7*

2.3.29 24590-HLW-DB-S13T-00288, *HLW Vitrification Building Structural Concrete Forming Section WB East Face*

2.3.30 24590-WTP-DD-S13T-00002, *Civil/Structural Standards Standard Embed Plates*

2.3.31 24590-PTF-DD-S13T-00301, *Pretreatment Facility Structural Concrete Embedments Typical Details -SH 2*

2.3.32 24590-WTP-LIST-CON-08-0001, *Restricted Materials List WTP Safety Assurance*

2.3.33 24590-HLW-Z0C-30-00035, *HLW Filter Cave Preheater Shielding Analysis*

2.3.34 24590-HLW-MED-HOP-00013, *Mechanical Data Sheet HOP HEPA Preheater*

2.3.35 24590-HLW-MED-PJV-00002, *Mechanical Data Sheet PJV HEPA Preheater*

2.3.36 24590-WTP-3PS-G000-T0019, *Engineering Specification for Acquisition of Commercial Items and Services for Use in Safety Applications at WTP*

2.4 Design Changes Incorporated by Reference

- 24590-WTP-SDDR-PROC-05-00069
- 24590-WTP-SDDR-PROC-05-00140
- 24590-WTP-SDDR-PROC-05-00142
- 24590-WTP-SDDR-PROC-05-00143
- 24590-WTP-SDDR-PROC-05-00148

3 Design Requirements

3.1 Basic Function

3.1.1 The Preheaters are located upstream of their respective HEPA filters in the offgas stream. The Preheaters are used to ensure the offgas stream temperature is sufficiently above the dew point to prevent moisture condensation in the HEPA filters.

3.1.2 The Preheaters are located in a 48 inches thick 2-hour fire rated barrier concrete wall (see Section 3.2.5) that also serves as a radiation and contamination boundary to separate the *R5/C5* area from the *R2/C2* area (see Section 3.4.2).

3.1.3 The Preheaters are to ensure confinement of radioactive materials to prevent releases that may result in consequences to the public, co-located worker, and facility worker above radiation exposure standards in the WTP Safety Requirements Document.

3.1.4 The Preheaters shall provide secondary confinement of aerosols during normal, abnormal, accident conditions and to prevent exposures that may results in exposure consequences to the facility worker above standards in the WTP Safety Requirements Document. The Preheaters are part of the *C5* boundary.

3.1.5 The Preheater enclosure shall maintain a 2-hour fire rated barrier for the penetration of the Preheaters in the wall between the *R5/C5* area and the *R2/C2* area.

3.1.6 The Preheater controller shall provide overheating protection to ensure HEPA filters, filter housing, concrete and structural components around the Preheater housing, and the Preheater enclosure are not damaged due to overheating.

3.2 Performance

3.2.1 The Preheaters shall be designed, fabricated, and tested per the mechanical and performance requirements of this specification, the MDSs, the EQDs, and the purchasing documents. Seller shall submit updated MDSs with the required information for approval by the Buyer per Form G-321-E of the MR.

3.2.2 Seller shall recommend additional operating parameters to be monitored for the Preheaters to achieve their required performance.

3.2.3 The Preheaters, with exception of the heating elements, shall be designed to operate for a minimum service life of 40 years.

3.2.4 The required mean time to failure (MTTF) for each heating element is 5 years @ 8760 hours of use per year.

3.2.5 The Preheaters will be installed in a 2-hour fire rated barrier wall and shall be designed and tested to perform a 2-hour fire rated barrier function, while exposed to fire on the C2 corridor side, and on the C5 cave side, of the wall but not simultaneously on both sides. The Preheater shall be constructed and tested to achieve a 2-hour fire rating in accordance with ASTM E119 Standard *Test Methods for Fire Tests of Building Construction and Materials.* Testing shall be done by Underwriters Laboratory, Inc. (UL) or a nationally recognized testing laboratory (NRTL).

3.2.6 Seller shall demonstrate through design that the Preheaters are able to maintain the contamination and pressure boundaries between the *R5/C5* area and *R2/C2* area at all times.

3.3 Preheater Design

3.3.1 As Low As Reasonably Achievable (ALARA) principles shall be applied to the design of the Preheaters per 10 CFR 835, *Occupational Radiation Protection.*

3.3.2 Seller shall design the Preheaters to meet the requirements of:

a. this specification
b. ASME AG-1 Articles AA-4000 and CA-4400
c. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 (for Preheater housing)
d. ASME Code for Pressure Piping, B31.3 (for piping associated with the Preheaters)
e. ANSI/AISC N-690 for Safety-Related Steel Structures (for steel structure of the Preheaters)
f. UL 499 or UL 834 as applicable for the heating elements of the Preheaters
g. Buyer specification 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication*
h. the MDSs and EQDs
i. the purchasing documents.

For the above listed, the more stringent of the requirements shall govern the design.

3.3.3 The Preheaters shall be designed to maintain contamination and pressure boundaries, and to maintain a 2-hour fire barrier rating, between the *R5/C5* area and *R2/C2* area at all times.

3.3.4 The offgas stream shall be contained within each Preheater plenum. The confinement boundary for the offgas stream shall be designed in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. Seller shall submit code calculations per Form G-321-E of the MR.

3.3.5 Nozzle design, loading and reinforcement shall be in accordance with Buyer specification 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication.* Seller shall provide nozzle loading calculations per Form G-321-E of the MR.

3.3.6 The Preheaters shall meet Level B service limits as defined in ASME AG-1 Article AA-4214 .

3.3.7 Refer to the MDSs for corrosion allowance requirements.

3.3.8 Seller shall design the Preheaters to fit within the space envelope specified in the MDSs. The local control panels shall be located in the *R2/C2* area in close proximity with their respective Preheaters, refer to Buyer drawing 24590-HLW-P1-P23T-00208, *HLW Vitrification Building Equipment Location Plan EL. 14'-0"/Area 208*. Each control panel will be welded or bolted to steel embed plates in the floor, refer to Buyer drawings 24590-HLW-DB-S13T-00054, 24590-HLW-DB-S13T-00057, and 24590-WTP-DD-S13T-00002. The dimensions of each local control panel shall not exceed 24 inches wide by 24 inches deep by 90 inches high.

3.3.9 Seller shall provide the operating and shipping weights for the Preheaters.

3.3.10 Seller shall provide a detailed design of the in-cast liner in accordance with Buyer specification 24590-WTP-DC-ST-01-001, *Structural Design Criteria*, and ANSI/AISC N690 (see Appendix B of this specification). Only liquid penetrant (LP) nondestructive examination of the liner welds is required. The concrete compressive strength is 5000 pounds per square inch. Refer to MDSs for the material of construction of the in-cast liner.

3.3.11 Seller shall provide equipment reliability figures for all major components and sub-components of the Preheaters and the basis for those figures. Where possible, the Seller shall compare the figures for the equipment in this specification to similar equipment sold and serviced by the Seller. The definition of components and sub-components is at Seller's discretion. The reliability figures shall include, as a minimum, the following:

a. Mean time between failure (MTBF).

b. Estimated modes of failure (example; dielectric breakdown, element overheat, etc.).

c. Estimated time that is required to perform the recommended maintenance, as applicable (mean time to repair, MTTR).

The data above shall be based on the physical and environmental conditions delineated in this specification, the MDSs and EQDs. The source for all estimates and any underlying assumptions shall be stated.

3.3.12 Seller shall provide detailed operating and maintenance instructions, in the form of a manual, or similar, for the Preheaters per Form G-321-E of the MR.

3.3.13 Individual heating element and temperature sensor shall be installed inside a thermowell, and be accessible from the *R2* corridor side through a removable shield plug, without removing any of the shield plates. The shield plug shall be placed directly behind each heating element/temperature sensor. The element/sensor should be connected to the shield plug (e.g. bolted flange, NPT connection etc.) so that the element/sensor and shield plug can be removed as a single unit.

3.4 Environmental Conditions

3.4.1 The Preheaters shall be able to withstand outdoor storage at ambient temperature ranging from -23°F to 113°F with relative humidity ranging from 5% to 100%, without incurring damage from such conditions prior to installation. Storage of the power and controls components shall meet the requirements of ASME NQA-2-1989, *Quality Assurance Requirements for Nuclear Facility Applications*, Part 2.2, for Level B storage.

3.4.2 The Preheaters are cast into a 48" thick concrete wall which serves as the boundary between an *R2/C2* area and an *R5/C5* area.. Refer to the MDSs and EQDs for high and low temperatures, relative humidities, and air pressures which will be maintained in the *R2/C2* area and *R5/C5* area during normal and abnormal plant operating and DBE conditions.

3.4.3 Refer to the MDSs and EQDs for other environmental qualification data of the Preheaters during normal, abnormal, DBE, and post-DBE conditions (as applicable).

3.4.4 Deleted.

3.4.5 Control and electrical systems and components will be installed in the *C2/R2* corridor which is considered to be a mild environment (refer to service conditions in the MDSs and EQDs).

3.4.6 Safety control and electrical systems and components shall be designed and qualified for the environmental conditions listed on the MDSs and EQDs, in accordance with Buyer specification 24590-WTP-3PS-JQ06-T0005, *Engineering Specification for Environmental Qualification of Control and Electrical Systems and Components*. Seller shall submit environmental qualification (EQ) procedures, test plans, analysis, and/or operating experience data report for Buyer review. EQ documents shall be in accordance with the requirements of 24590-WTP-3PS-JQ06-T0005, Section 6.

3.4.7 Mechanical components shall be designed and qualified for the environmental conditions listed on the MDSs and EQDs, in accordance with Buyer specification 24590-WTP-3PS-G000-T0015, *Engineering Specification for Environment Qualification of Mechanical Equipment.* Seller shall submit environmental qualification (EQ) procedures, test plans, analysis, and/or operating experience data report for Buyer review. EQ documents shall be in accordance with the requirements of 24590-WTP-3PS-G000-T0015, Section 6.

3.5 Loading

3.5.1 Seller shall design the Preheaters to be self-supporting and be capable of handling the loads and moments imposed on the Preheaters during testing, packaging, shipping, handling, storage, installation, operation, and Design Basis Events. Seller shall provide calculations and/or test reports to support the design basis.

3.5.2 Loads to be considered for the structural design of the Preheaters shall be in accordance with the codes, standards, and referenced documents listed in Section 2 of this specification. As a minimum, loadings and stresses to be imposed shall meet Level B service limits as defined in article AA-4214 of ASME AG-1.

3.5.3 Seller shall perform and submit seismic analysis/testing and qualification per the requirements of Buyer specification 24590-WTP-3PS-SS90-T0001, *Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks*. Refer to Section 2 of the MR, the MDSs and EQDs, and the In-Structure Response Spectra (ISRS) figures referenced in the MR Technical Notes.

3.5.4 Load bearing steel components shall be designed in accordance with ANSI/AISC N690-94 as tailored in the SRD. See Appendix B of this specification.

a. The abnormal conditions shown on the EQDs are not consistent with the abnormal loads described in ANSI/AISC N690-94. Stresses due to abnormal conditions (if applicable)

documented on the EQDs are to be considered as normal conditions, however, stresses due to abnormal conditions need not be included in the seismic load combinations.

b. Stresses due to DBE conditions (if applicable) documented on the EQDs need not be included in the seismic load combinations unless the conditions are due to a high energy line break. If the DBE conditions are due to a high energy line break, this will be documented on the EQDs.

3.5.5 Seller shall provide nozzle displacement, including seismic anchor movement, for seismic loads.

3.6 Electrical Requirements

3.6.1 Electrical requirements for the Preheaters shall be in accordance with Buyer specification 24590-WTP-3PS-EKP0-T0001, *Engineering Specification for Electrical Requirements for Packaged Equipment.*

3.6.2 Deleted.

3.6.3 Seller shall determine the qualified life of Quality Level "Q" electrical equipment and components (refer to the Quality Level designation in the MDSs) that are susceptible to significant thermal and radiation aging in accordance with IEEE 323. Seller shall provide the Buyer a listing of such equipment and components.

3.6.4 The available power supply for the Preheaters are:

a. 120 Volts, alternating current, uninterrupted power supply (by others).
b. 480 Volts, alternating current (by others).

3.7 Instrumentation and Control Requirements

3.7.1 Seller shall design and fabricate each Preheater and respective heating control system in accordance with Buyer specification 24590-WTP-3PS-JQ07-T0001, *Engineering Specification for Instrumentation for Package Systems.*

3.7.2 Buyer specification 24590-WTP-3PS-JQ06-T0003, *Engineering Specification for Seismic Qualification of Seismic Category I Control and Electrical Systems and Components* shall apply to Seismic Category I instrumentation, control systems and components.

3.7.3 Deleted.

3.7.4 Seller shall provide instrumentation, controls, interlocks, and logic control required for the Preheaters to achieve their required performance.

3.7.5 Seller's design shall provide the ability for functional testing of the Preheaters, and the Preheater control system.

3.7.6 Thermowell design shall be by Seller. Inlet and discharge thermowells shall extend a minimum of 12 inches into respective piping. The housing thermowell shall be located on the housing skin at the maximum temperature location calculated by the Seller, for housing over-temperature protection. Seller shall submit proposed design to Buyer for review.

3.7.7 Design of the Preheater shall allow for continuous operation despite individual heating element failure, until the maximum element failure percentage as stated in the MDS is reached. Each heating element shall include an internal thermocouple to provide over-temperature protection.

3.7.8 Seller shall provide a local control panel for each Preheater. Control for the Preheater shall be via the local control panel or via the Integrated Control Network (ICN) from a remote location. Each local control panel (local) or ICN (remote) shall include, but is not limited to, the following:

a. Local/Remote (transfer selector for panel or ICN control) with electrically isolated indication to the ICN
b. Start/Stop control at local panel or from the ICN (electrical isolation required)
c. Hand/Off/Automatic Control (local)
d. Offgas inlet and outlet temperature indication
e. Preheater On/Off indication (local/remote)
f. Fault indication for each heating element and alarm for each heating element (local)
g. Inlet and Outlet temperature electrically isolated analog outputs to the ICN
h. Fault (any) electrically isolated discrete output to the ICN
i. Failure (any) electrically isolated discrete output to the ICN
j. All control set points shall be adjustable locally
k. Preheater differential temperature control shall be adjustable remotely at the ICN (electrical isolation required).

3.7.9 Deleted.

3.7.10 The HLW Melter Offgas Treatment Process System (HOP) Preheater control system shall maintain a delta temperature setpoint through the Preheater. Delta temperature setpoint will be maintained by the local Preheater controller. ICN 'Start' command shall be latched at the Preheater control system so the control system will continue to operate if the ICN were to fail. In 'Remote' mode the Preheater control system shall control to the last setpoint value on loss of ICN 'Setpoint'.

3.7.11 The HLW Pulse Jet Ventilation System (PJV) Preheater shall be designed to maintain offgas humidity at a level sufficient to preclude condensing conditions within the HEPA filters downstream of the Preheater. Humidity levels in the air stream shall be inferred from the air temperature measured at the inlet to the Preheater.

3.7.12 Components designated as Safety Class (SC) shall be designed and qualified to function as intended in the environments associated with the events for which they are intended to respond (normal, abnormal, and post DBE). In addition, components designated as Safety Significant (SS) shall be designed to function as intended in the environments associated with the events for which they are intended to respond. The effect of aging on normal and abnormal functioning shall be considered in design and qualification. Acceptance criteria for adequate performance of SC and SS components are in this specification, the MDSs, and the purchasing documents.

3.7.13 Safety (SC and SS) components shall be physically separated and electrically isolated from the non-Safety components. Separation and isolation between the Safety and non-Safety components shall be designed in conformance with Buyer specification 24590-WTP-3PS-JQ07-T0001, *Engineering Specification for Instrumentation for Package Systems* and IEEE 384 requirements.

3.7.14 Seller shall provide the following Safety components to interface with the Buyer's Programmable Protection System (PPJ):

a. Analog temperature indication output to PPJ for inlet offgas.

b. Analog temperature indication output to PPJ for outlet offgas.

c. Analog temperature indication output to PPJ for housing/pressure boundary (for preheater housing over-temperature protection).

The above Safety components shall use transmitters with appropriate output voltage isolation to provide the analog temperature indication signals. Safety signal cables shall be segregated from non-Safety cables, and shall be wired to a local junction box for interface with the Buyer's control system.

Safety components shall be Safety Integrity Level 2 (SIL-2) capable in accordance with International Electrotechnical Commission (IEC) 61508-2 and IEC 61508-3 as appropriate and documented as such by a certificate from a nationally recognized testing laboratory (NRTL).

3.7.15 All components that perform or support a Safety control or Air Permit function (such as temperature indicators and transmitters) are Safety or Air Permit affecting and shall be Quality Level "Q" items.

3.7.16 Seller shall prepare and submit Preheater control specification describing the process control, delta temperature control, over-temperature control, power control, and control logic diagram(s) illustrating the control logic scheme to Buyer for review and permission to proceed. Seller shall also provide detailed requirements for Buyer supplied external wiring and cabling to the Preheaters.

3.8 Thermal Analysis Requirements

3.8.1 Seller shall demonstrate, in the form of a calculation or similar, that the Preheaters are able to withstand all the thermal stresses in their 40 year service life.

3.8.2 Seller shall provide thermal analysis to:

a. Confirm the Preheaters perform to the requirements of this specification, the MDSs, the EQDs, the purchasing documents, and referenced codes, standards and documents.

b. Confirm the surface temperature of the concrete walls in contact with the Preheaters do not exceed the maximum allowed temperature per Section 3.9.2.

c. Determine the requirement for personal protection on the *R2/C2* side of the Preheaters.

3.8.3 The method of analysis shall be proposed by the Seller.

3.8.4 The thermal analysis shall include startup, normal operation, upset, and shutdown conditions.

3.8.5 Seller shall provide heater capacity and thermal stress calculations for the Preheater design.

3.8.6 Seller shall provide nozzle displacement, including thermal anchor movement, for normal operating and upset conditions.

3.9 Thermal Insulation Requirements

3.9.1 Seller shall provide insulation in accordance with Buyer specification 24590-WTP-3PS-NN00-T0001, *Engineering Specification for Thermal Insulation for Mechanical Systems.*

3.9.2 The maximum allowable surface temperature of the concrete wall in contact with the Preheaters is noted on the MDSs.

3.9.3 Seller shall determine the surface temperature of the Preheaters on the *R2/C2* corridor side. If the temperature exceeds 140°F, Seller shall provide and install removable blanket insulation for personnel protection.

3.9.4 Deleted.

3.9.5 Seller shall provide a method for easy and safe replacement of thermal insulation that does not meet the design life of 40 years and for insulation that will require removal for maintenance.

3.10 Radiation Shielding Requirements

3.10.1 Seller shall design and provide a minimum of 9.5 inches of equivalent steel (33 inches of concrete), radiation shielding on both the *R5* cell and *R2* corridor sides of the heater unit, as shown on the MDSs. The shielding on the *R5* cell side shall block all potential shine paths from in-cell sources during change out of the heating elements and temperature sensors. The shielding on the *R2* corridor side shall block all potential shine paths from in-cell sources, including those which shine through the offgas inlet and discharge nozzles.

3.10.2 Deleted.

3.10.3 Radiation shielding shall be designed using overlapping layers of shielding plates to achieve the required shielding thickness. The shielding design shall incorporate features for safe and easy assembly and removal of the shielding plates.

3.10.4 Shielding plugs that must be removed for Preheater maintenance shall not exceed 500 pounds each.

3.10.5 Shielding plates not routinely removed for Preheater maintenance shall not exceed 2500 pounds each. The minimum shielding plate thickness shall be 1 inch.

3.10.6 Each shielding component shall be uniquely identified using 1/2 inch high stamped characters to assist assembly and have suitable attachment points for balanced lifting and assembly.

3.10.7 Seller shall provide an assembly map to show the on-site assembly sequence of shielding components.

3.10.8 Penetrations through the shield plug for the heating element and temperature sensor lead wires shall not compromise shielding by allowing any direct radiation shine path through the shield plug. The lead wires shall come through the shield plug in a joggle penetration which conforms with the geometric configuration as shown on the sketch in the MDSs. The shield plug must be designed in a manner that maintains at least 4 inches of shielding behind each elbow of the joggle penetration.

3.11 Lifting Requirements

3.11.1 Design of lifting lugs shall be by Seller.

3.11.2 Lifting lug design shall be justified by calculation for eye pullout, bending, weld strength, and Preheater stress for the intended method of lift and material used.

3.11.3 Lifting lugs shall be stamped with the Preheater dry weight as defined by the Seller.

3.11.4 Lifting lugs shall be installed on each Preheater for balanced lifting and handling.

3.11.5 All lifting points shall be designed and tested in accordance with 24590-WTP-3PS-G000-T0003, *Engineering Specification for Packaging, Handling, and Storage Requirements.*

3.12 Accessibility and Maintenance

3.12.1 Preheater maintenance including replacement of individual heating element and temperature sensor shall be performed from the *R2/C2* area. The Preheaters will not be accessible for maintenance from the *R5/C5* area once they are put in operational service.

3.12.2 Refer to Buyer drawing 24590-HLW-P1-P23T-00208, *HLW Vitrification Building Equipment Location Plan EL. 14'-0"/Area 208* and the MDSs for the allowable space for operations and maintenance of each Preheater in the *R2/C2* area.

3.12.3 Seller shall provide a list of equipment and components requiring maintenance or replacement over the 40 year minimum service life of the Preheaters. The list shall include recommendations for frequency of maintenance and replacement. Seller shall provide a spare parts list.

4 Materials

4.1 General

4.1.1 All materials of construction for the Preheaters shall conform to the requirements of:

- this specification
- ASME AG-1 Articles AA-3000, CA-3400 and CA-3500
- the MDSs and EQDs
- the purchasing documents

4.1.2 All materials used shall be new and free of defects.

4.1.3 All materials used shall be resistant to deterioration when used in a radioactive environment for a minimum service life of 40 years.

4.1.4 Seller shall furnish legible copies of Certified Material Test Reports (CMTR) or Material Manufacturers Certificate of Compliance for all bulk carbon and stainless steel materials (plate, shapes, pipe, bolts, nuts, threaded rod, etc.) used for the fabrication of the Preheater in-cast liner, shield plates and mounting hardware, plenum and mounting hardware, and control/power enclosure support steel and mounting hardware. All materials shall be traceable to the CMTR through markings or drawing prints.

4.1.5 Seller shall not substitute materials specified in this specification, the applicable documents, the MDSs, and the purchasing documents without written approval from the Buyer.

4.1.6 Seller shall maintain a positive system of identification of materials used in the fabrication of the Preheaters in accordance with Buyer specification 24590-WTP-3PS-G000-T0002, *Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication.*

4.1.7 Seller shall provide Material Safety Data Sheets for all materials used in the construction of the Preheater housings (confinement boundary and exposure to offgas process flow) and in the heating element and temperature sensor thermowell assemblies (exposure to offgas process flow).

4.1.8 All material shall be controlled, issued, handled, and stored with proper identification and traceability. Seller shall prepare and submit material control procedures for Buyer review.

4.2 Prohibited Materials

4.2.1 Mercury, lead, aluminum, zinc, their alloys, or materials containing such metals as their basic constituents shall not be used in the construction of the Preheaters. Teflon shall not be used in the construction of the Preheaters.

4.2.2 Molybdenum, sulfides, and halides shall not be used in direct contact with stainless steel.

4.2.3 Materials that contain halides shall not be used in any component of the Preheaters.

4.2.4 Asbestos shall not be included in any component of the Preheaters or insulation.

4.2.5 Carbon steel shall not be included in any component of the Preheaters that comes into direct contact with the offgas stream.

4.2.6 Certain chemicals/materials are restricted from use at WTP. Refer to 24590-WTP-LIST-CON-08-0001, *Restricted Materials List* for the complete list of restricted chemicals/materials. The use of any restricted chemicals/materials requires authorization from the Buyer (WTP Safety Assurance).

5 Fabrication

5.1 General

5.1.1 Fabrication of the Preheaters shall conform to the requirements of:

- this specification
- ASME AG-1 Articles AA-6000 and CA-6000
- the MDSs and EQDs
- the purchasing documents

5.1.2 The confinement boundary for the offgas stream shall be fabricated to the requirements of ASME Boiler and Pressure Vessel Code Section VIII, Division 1, and Buyer specification 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication.*

5.1.3 All edges shall be rounded and smooth to the touch. All stainless steel surfaces shall be clean, free of stains, scale, and deposits. All weld spatter, slag, and heat affected zone oxides shall be removed.

5.1.4 Seller shall determine and specify tolerances, surface flatness, and finish requirements for assembly and fabrication of the Preheaters at the detailed design stage. At a minimum, all tolerances, surface flatness, and finishes shall be in accordance with all applicable codes, standards, and references documents in Section 2 of this specification.

5.2 Welding

5.2.1 Welding of the Preheaters other than the containment boundary for the offgas stream shall conform to the requirements of:

- this specification
- ASME AG-1 Articles AA-6300 and CA-6120
- the MDSs and EQDs
- the purchasing documents

5.2.2 The containment boundary for the offgas stream shall be welded to the requirements of Buyer specification 24590-WTP-3PS-MVB2-T0001, *Engineering Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers,* where applicable.

5.2.3 Seller shall submit Welding Procedure Specification (WPS) and Procedure Qualification Requirements (PQR) per the applicable codes and specifications.

5.2.4 All welds along the contamination confinement boundary shall be continuous.

5.2.5 Major repairs using welding shall be in accordance with specification 24590-WTP-3PS-MVB2-T0001, *Engineering Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers.* Repair plans shall be submitted for Buyer review. A review status of "Work May Proceed" must be obtained prior to use.

5.3 Cleaning, Finishing, and Coating

5.3.1 Cleaning, finishing, and coating of the Preheaters shall conform to the requirements of:

- ASME AG-1 Articles AA-6500 and CA-6200
- ASME NQA-2 Part 2.1 *Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants*
- Buyer specification 24590-WTP-3PS-AFPS-T0001, *Engineering Specification for Shop Applied Special Protective Coatings for Steel Items and Equipment,* where applicable.

6 Tests and Inspections

6.1 General

6.1.1 Seller shall conduct and be responsible for all testing and inspections of the Preheaters per the requirements of this specification, ASME AG-1 Articles AA-5000 and CA-5400, and all applicable references in Section 2 of this specification.

6.1.2 Seller shall develop and submit detailed procedures for all tests and inspections for the Preheaters per the requirements of this specification, applicable codes, standards, reference documents, and Form G-321-E of the MR for Buyer review.

6.1.3 Seller shall complete and submit reports of all testing and inspections required by this specification and per Form G-321-V of the MR. Each report shall identify the component tested or inspected, date performed, applicable procedures, acceptance criteria, person performing the test or inspection, results, and conclusions.

6.1.4 Control and calibration of measuring and test equipment shall be in accordance with Article AA-5130 of ASME AG-1.

6.2 Personnel Qualifications

6.2.1 All inspections and tests shall be performed by personnel qualified per the requirements of this specification and all applicable references in Section 2 of this specification.

6.2.2 Seller shall submit personnel qualification documents of Seller's inspection and test personnel, for Buyer review.

6.3 Shop Tests

6.3.1 Seller shall provide all materials, labor, tools, equipment, appurtenances, and instrumentation to conduct all shop tests on the Preheaters.

6.3.2 Seller shall conduct tests and inspections specified in ASME AG-1 Articles AA-5000 and CA-5400 on each Preheater.

6.3.3 Seller shall conduct visual inspection on the Preheaters and provide an inspection checklist for Buyer review.

6.3.4 Seller shall conduct weld inspections for soundness using radiography and liquid penetrant examinations on each Preheater in accordance with ASME AG-1 Article AA-5300 and Buyer specification 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication*, where applicable.

6.3.5 Seller shall conduct pneumatic leak test on the plenum of each Preheater in accordance with ASME Boiler and Pressure Vessel Code, Section V and Buyer specification 24590-WTP-3PS-MV00-T0001, *Engineering Specification for Pressure Vessel Design and Fabrication.* Acceptance criterion: *No leaks observed.*

6.3.6 Deleted

6.3.7 Instrumentation and control systems shall be functionally tested, inspected, and calibrated in accordance with ASME AG-1 Article CA-5400 and Buyer specification 24590-WTP-3PS-JQ07-T0001, *Engineering Specification for Instrumentation for Package Systems, Section 6.*

6.3.8 Seller shall provide all equipment, instrumentation, labor, and materials to perform a lifting test in the shop, demonstrating that the lifting lugs or attachment points are adequate to support the Preheaters without any distortion. Seller shall provide a shop test report on lifting points provided on each Preheater.

6.3.9 A test report shall be prepared for each completed test. All test results shall be documented, certified (signed) by appropriate employee of the Seller, submitted to the Buyer, and included in the documentation package.

6.3.10 Seller shall perform fit-up test on one (1) of the fully assembled Preheaters and witnessed by the Buyer, to demonstrate:

- Mounting of the Preheater plenum to the in-cast liner
- Assembly and removal of the radiation shielding plates and shielding plugs
- Installation, removal, and replacement of the heating element and temperature sensor.

The Preheater used for the demonstration shall be chosen by the Buyer.

7 Preparation for Shipment

7.1 General

7.1.1 The Preheaters shall be prepared for shipment in accordance with:

- Buyer specification 24590-WTP-3PS-G000-T0003, *Engineering Specification for Packaging, Handling and Storage Requirements*
- ASME AG-1 Article CA-7000

7.1.2 All results of shop tests and inspections for the Preheaters shall be reviewed by the Buyer prior to preparing and packaging the Preheaters for shipment.

7.1.3 Seller shall verify, by calculation, that the Preheaters and its internals will withstand loads occurring during shipping, handling, and installation.

7.2 Tagging

7.2.1 A stainless steel nameplate shall be permanently and rigidly affixed to each Preheater containing, as a minimum, the following information:

a. Seller's name and serial number
b. year of manufacture
c. Buyer's purchase order number
d. plant item number as furnished by the Buyer
e. capacity, kW
f. electrical characteristics, V/Phase/Hz

7.2.2 The information shall be stamped or etched on the nameplate using characters no less than 1/4 inch tall.

7.2.3 The attachment and location of nameplates shall be in accordance of Articles AA-9130 and AA-9140 of ASME AG-1.

7.2.4 All packages shall be clearly and suitably tagged to at least show the Seller's name, Buyer's name, plant item number, purchase order number, package contents, parts list, and handling instructions for each package.

7.3 Shipping, Handling and Storage Instructions

7.3.1 Seller shall submit shipping weights as well as detailed shipping, handling, and storage instructions for the Preheaters prior to its shipment per Form G-321-E of the MR.

7.3.2 Seller shall provide storage instructions for storage interval greater than one year. See Section 3.4.1 of this Specification for the environmental conditions for long term storage of the Preheaters.

8 Quality Assurance (QA)

8.1 General Requirements

8.1.1 Deleted.

8.1.2 Deleted.

8.1.3 Seller's Quality Assurance Program (QAP), as a minimum, shall contain the requirements detailed in the Supplier Quality Assurance Program Requirements data sheet listed in Section 2 of the MR.

8.2 Quality Related Components

8.2.1 Deleted.

8.2.2 The successful bidder must pass a pre-award survey by the Buyer. Seller shall demonstrate that its quality program is in compliance with the procurement quality requirements listed in the Supplier Quality Assurance Program Requirements Data Sheet. Seller shall allow the Buyer, its agents, and DOE access to their facility and records pertaining to this purchase order for the purpose of QA audits and surveillance at mutually agreed times.

8.2.3 All items shall be manufactured in accordance with Seller's QAP that meets the requirements of ASME NQA-1, and has been previously evaluated and accepted by the WTP Quality Assurance Organization.

8.2.4 Deleted

8.2.5 If Seller subcontracts any work (engineering, fabrication, testing etc.) on "Q" SSCs items, Seller is responsible to audit and approve Subcontractor's NQA-1 program.

8.2.6 As required, commercial grade items (CGI) for "Q" applications shall be dedicated in accordance with Buyer specification 24590-WTP-3PS-G000-T0019, *Acquisition of Commercial Items and Services for Use in Safety Application at WTP.*

9 Configuration Management

9.1 The equipment covered by this specification is identified with the plant item number shown in the MDSs. The equipment shall be identified in accordance with Section 7.2, Tagging, of this specification.

9.2 Substitutions and deviations must be in accordance with Section 2 of the MR.

10 Documentation and Submittals

10.1 General

10.1.1 Seller shall submit for Buyer review all detailed designs, documentation, procedures, instructions (including erection and installation instructions), calculations, analyses, models, manufacturer data, inspection reports, test reports, environmental and seismic qualification reports, certified material test reports, certifications, certificates, manuals (including operations and maintenance manuals), Material Safety Data Sheets, spare parts list, and drawings required per this specification, its addenda and attachments, the purchasing documents, and referenced codes, standards and Buyer documents.

10.1.2 Seller shall submit to Buyer the Engineering and Quality Verification documents in the forms, quantities, and timing shown in Form G-321-E, *Engineering Document Requirements*, and Form G-321-V, *Quality Verification Document Requirements*, in Section 3 of the MR.

10.1.3 Each documentation transmittal package shall have a documentation inventory sheet attached listing all documents and the number of pages in each package.

10.2 Calculations and Analyses

10.2.1 Deleted.

10.2.2 All calculations and analyses to be provided to the Buyer shall be done in accordance with 24590-WTP-3PS-G000-T0014 *Engineering Specification for Supplier Design Analyses.*

10.2.3 Calculations/analyses to be provided for Buyer's review shall include, but are not limited to:

a. Calculation/analysis to demonstrate that the Preheater is able to maintain the contamination and pressure boundaries in accordance with Section 3.2.6 of this specification.
b. Preheater design and performance calculations/analyses in accordance with Section 3.3 of this specification, including ASME Boiler and Pressure Vessel Code Section VIII analysis.
c. Environmental Qualification analyses in accordance with Section 3.4 of this specification.
d. Loading and seismic analysis and qualification in accordance with Section 3.5 of this specification.
e. Thermal analysis and calculations in accordance with Section 3.8 of this specification.

f. Lifting, handling and shipping load analyses in accordance with Sections 3.11 and 7.1 of this specification.

10.3 Schedules

10.3.1 A detailed schedule of engineering, document submittals, material purchases, fabrication, shop tests, and shipment shall be submitted using Form 15EX in Section 3 of the MR.

10.4 Drawings

10.4.1 Seller shall provide all drawings required per this specification and the applicable documents in Section 2 of this specification.

10.4.2 Seller shall produce all drawings per the drawing practices set forth in ASME Y14.100, *Engineering Drawing Practices.*

10.4.3 Seller shall submit drawings and diagrams for Buyer review prior to fabrication, and/or purchase of appurtenance equipment. Drawing and diagram submittals shall include as a minimum, but are not limited to, the following:

a. Outline drawings showing dimensions, services, insulation, and foundation and mounting details.
b. Outline drawings showing electrical and instrumentation tie-in points.
c. Outline drawings showing locations of piping connections with nozzle schedule, including sizes of piping connections, including required location and sizes of wiring connections.
d. Overall single line diagram (wiring diagram) showing all electrical equipment and wiring for the Preheaters and local control panels.
e. Control logic diagrams showing input signal paths required to accomplish a response.
f. Assembly drawings with sufficient information and detail to facilitate assembly of the component parts of an equipment item, including drawings illustrating the removal and reassembly of the radiation shielding plates and associated components.
g. Shop detail drawings that provide information and details to facilitate fabrication, manufacture, inspection, and installation.

Appendix A

Not Used

Appendix B

ANSI/AISC N690, Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities - *Tailored*

3.0 ANSI/AISC N690, "Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities"

Revision: 1994
Sponsoring Organization: American National Standards Institute/American Institute of Steel Construction

RPP-WTP Specific Tailoring

The following tailoring of ANSI/AISC N690 is required for use by the WTP contractor as an Implementing Standard for structural design.

Page 22, Section Q1.5.7.1 Primary Stresses

Revise the stress limit coefficients for compression in Table Q1.5.7.1 as follows:

- 1.3 instead of 1.5 [stated in footnote (c)] in load combinations 2, 5, and 6
- 1.4 instead of 1.6 in load combinations 7, 8, and 9
- 1.6 instead of 1.7 in load combination 11

Justification: These changes are made for consistency with the NRC requirements of Appendix F of section 3.8.4 of NUREG-0800 (Draft Rev. 2).

Page 22, Section Q1.5.7.1 Primary Stresses

Delete the following load combinations:

4. D + L + Eo
6. D + L + Ro + To + Eo

Justification: These load combinations are required for evaluation of an Operation Basis Earthquake (OBE). The WTP project has not identified an OBE event.

This section has been deleted.

Appendix C

ASME AG-1, Code on Nuclear Air and Gas Treatment - *Tailored*

35.0 ASME AG-1, Code on Nuclear Air and Gas Treatment

Revision: 1997 (R2000)
Sponsoring Organization: The American Society of Mechanical Engineers

WTP Specific Tailoring

The following tailoring of ASME AG-1 is required for use by the RPP-WTP project as an implementing standard for the use of safety radial HEPA filter systems and the use of safety axial flow HEPA filters as inbleed units in the Laboratory C5V Exhaust System. Where not specifically identified herein, the remainder of the code requirements are invoked.

Section FK is added as an addendum to ASME AG-1-1997 with the ASME AG-1a-2000 Addenda AG-1 edition invoked on the project.

In addition to the above tailoring for HEPA filter systems, ASME AG-1 is tailored to add ISO 1940-1:2003, Mechanical Vibration - Balance Quality Requirements For Rotors in A Constant (Rigid) State - Part 1: Specification And Verification Of Balance Tolerances, for balancing multi-stage blowers.

Page 228.9; Article HA-2000 Reference Documents

Revise Article HA-2000 as follows:

Change the code edition of ASME N509 as applied as a referenced (daughter) standard to AG-1 from 1989, reaffirmed December 6, 1996 to 2002.

Justification: The version of the ASME N509 Standard currently referenced as a daughter by AG-1 was issued in 1989 and Reaffirmed in 1996. At the time the N509-1989 (R1996) code was selected to be a daughter of AG-1, the ASME AG-1 code did not include requirements for HEPA filter housings. These requirements were later added in the 2000 Addenda to the AG-1 code. The ASME N509-2002 edition does not provide component requirements for HEPA filter housings and HEPA filters but instead refers the user to AG-1 for this information. Therefore, by making this change it will reduce potential redundancies and conflicts.

Page 228.16; Subsubarticle HA-4420 Access Doors and Panels

Revise Subsubarticle HA-4420 as follows for remote change housings:

Not applicable. The requirements of this article are not applicable to Remote Change Radial HEPA Filter Housings; the access doors and panels shall satisfy HA-4500, Pressure Boundary Leakage, and HA-5300, Pressure Boundary Leakage Testing.

Justification: Remote housings are not designed to "incorporate a means for adjusting compression forces, gasket compression..." There are not hinges or latches in the design and they are not designed for manual operation. Therefore, the requirements described in this code article are not applicable.

The remote housing design requires remote access, using a grapple to manipulate doors in a cave environment that may become subject to contamination and high radiation fields. The design incorporates low maintenance features not subject to failure (i.e., vertical housings and heavy doors). The housing doors seal by virtue of their weight alone. Door guides are included. A bar placed across the tops of the doors (and pinned in position) is used to ensure the doors remain in place during seismic events.

Page 228.18; Paragraph HA-4443 Clamping Mechanism

Revise Paragraph HA-4443 as follows for remote change and safe change radial HEPA housings:

Replace the text with: The requirements of this article are not applicable to Safe Change and Remote Change Radial HEPA Filter Housings. For Safe Change and Remote Change Radial HEPA filter housings, the design shall ensure that the housing knife-edge is embedded into the pliable filter sealant and will provide a seal for the complete perimeter of each filter.

Justification: The remote change housings are not side access housings and are not designed for manual operation. There are no clamping mechanisms or filter indexing mechanisms. The weight of the remote filter and differential pressure across the filter is relied upon to ensure that the knife-edge is embedded into the fluid seal.

The safe change housings are front access and are not walk-in style. The filter is not accessed from its side. Therefore, filter retrieval features and filter indexing mechanisms do not apply. A clamping mechanism that is capable of moving the filter (e.g., for side access housings) is not required. The safe change housings are designed to allow a person to insert and remove each filter.

Subarticle FK-4100 General Design

Revise second paragraph of Subarticle FK-4100 as follows for remote change and safe change radial HEPA filter designs:

Replace the text with: For Remote Change and Safe Change Radial HEPA Filters, the total media area provided within the filter pack shall be such that maximum media velocity is 6.5 ft/min (2.0 m/min) at the rated flow.

Justification: The RPP-WTP radial filter design is based upon a UK Atomic Energy Standard Specification AESS 30/95100. This Standard contains an equivalent requirement to that found in AG-1. It states: "The effective area of filter medium used for each insert shall be not less than 3.0 sq m for every 100 l/s rated airflow." The Project proposes to meet this criterion. Converting these metric units for a UK 950 l/s (~2,000 cfm) rated filter equates to approximately 6.5 ft/min media velocity or a minimum of 308 sq. ft of media.

The DOE Nuclear Air Cleaning Handbook (Reference DOE-HDBK-1169-2003 Chapter 2.3.7 and Figure 2.8(a)) illustrates the importance and intent behind this code requirement. AG-1 Subsubarticle FK-1130 states that a HEPA filter shall have *"a minimum efficiency of 99.97% (that is, a maximum particle penetration of 0.03%) for 0.3 micrometer diameter test aerosol particles."* This defines the minimum performance of a HEPA type filter. The curves depicted in Figure 2.8(a) of the Handbook show that at 10.5 ft/min air velocity, the 0.30-micron particle size can be expected to penetrate a HEPA filter such that the AG-1 FK-1130 performance requirement would not be met.

Numerous aerosol penetration tests have been performed on the proposed filter design both inside prototype housings and on individual prototype radial filters designed with a media area of 236 sq. ft., or approximately 8.5 ft/min media velocity. Each test demonstrated that a filter design with media velocities of this magnitude would meet the qualification performance requirements as stated in AG-1 (e.g., 99.97% efficiency or better for penetration of 0.3-micron particles).

The proposed RPP-WTP design uses a filter with approximately 325 sq. ft. of effective media area, or a media velocity of approximately 6.1 ft/min. This represents a small improvement on the UK design and therefore continues to meet the UK Standard requirement.

Further addition of filter media to meet the more restrictive AG-1 Section FK requirement would possibly result in other undesirable design and performance characteristics (e.g., increased DP, reduced pleat spacing). The filter geometry is also limited by many other design restrictions including: available building space, personnel filter handling limitations, and waste disposal package limitations.

Table FK-4000-1

Revise Table FK-4000-1 rating information for the 2,000 acfm filter as follows for remote change and safe change HEPA radial filter designs:

TABLE FK-4000-1 (TAILORED)
TYPE 1 RADIAL FLOW HEPA FILTER – NOMINAL RATINGS

Maximum Rated Air Flow		Maximum Resistance	
(acfm)	(m3/hr)	Inches WC	Pa
40	68	1.3	325

Maximum Rated Air Flow		Maximum Resistance	
(acfm)	(m3/hr)	Inches WC	Pa
100	170	1.3	325
250	425	1.3	325
500	850	1.3	325
1000	1700	1.3	325
1500	2550	1.3	325
2000	3400	1.6	400

Justification: A new filter design is being developed with the intent of qualifying it in accordance with the AG-1 code. The RPP-WTP radial flow HEPA filter design originated from UK Atomic Energy Standard Specification AESS 30/95100. The radial flow HEPA filters will be designed for a maximum initial pressure drop of approximately 1.55 inches WC at a rated flow of 2,000 cfm. This is just slightly greater than (~ delta of 0.15 inches WC) the acceptance criterion stated in UK Atomic Energy Standard Specification AESS 30/95100. This increase in observed pressure drop is primarily due to small design differences between the UK design and the design proposed for use in the RPP-WTP. These differences include increases in filter pack depth, increases in faceguard to media pack gaps (used to enhance protection of the media), and space to accommodate the filters gel seal channel. The UK filter pack depth is approximately 68mm or ~2.7 inches. The RPP-WTP filters are available in 1-inch increment pack depths with a 3-inch pack depth proposed for use on the RPP-WTP. The slightly deeper RPP-WTP media pack design will increase the filter media area and increase the removal efficiency for small particles. The benefits gained in the RPP-WTP radial filter design are viewed to outweigh the negligible increase in airflow resistance (~ 3 to 5% of typical filter loading at change-out of filter element).

Paragraph FK-6211 Flatness and Squareness

Revise Paragraph FK-6211 (a) as follows for remote change and safe change radial HEPA filter designs:

Type 1 filter flange and end cap tolerances shall meet the following criteria: parallel within 1/8 in., flat within 1/16 in.

Justification: TAILORING OF PARALLELISM TOLERANCE: The tailoring presented above changes the code requirement for flange to end cap parallelism from 1/16 in. to 1/8 in. For the Remote Change Filter, the inlet flange, which includes the gel channel with a nominal width of 3/4 in., creates the seal and supports the filter inside the housing. The outlet end cap is fully suspended inside the housing by the opposite inlet flange (i.e., outlet end cap does not touch the housing and is not used to form the seal).

Parallelism to within 1/8 in. will ensure that an adequate housing-to-filter seal is created. For the Safe Change Filter, as with the remote filter, the seal is formed by insertion of a housing knife-edge into a filter gel filled channel with a nominal width of 3/4 in. The gel channel is located on the filter inlet flange. Parallelism to within 1/8 in. will ensure an adequate housing-to-filter seal is created.

TAILORING OF SQUARENESS TOLERANCE: The "squareness" tolerance from FK-6211 is being addressed with a tolerance for circular runout as stated in tailoring for FK-6212. Circular runout controls the cumulative variations that may be present in the positional relationship between the inlet flange and outlet end cap. Inspection for circular runout is equivalent to and meets the code requirement to maintain the squareness characteristic while taking into account the entire length of the filter. Maintaining radial filter circular runout to within the 3/32" tolerance will ensure the filter forms an adequate seal within the filter housing.

Paragraph FK-6212 Overall Dimensions

Replace Paragraph FK-6212 as follows for the remote change and safe change radial HEPA filter design: Type 1 filter length shall be (+0 / -1/8 in.), circular runout of filter flange with respect to the filter end cap shall be within 3/32 in., all other dimensions ±1/16 in.

Justification: "Seal ring" and "seal face" are terms specific to Section FK radial filters with gaskets and therefore dimensions and tolerances associated with these terms are not applicable to the Type 1 gel seal radial filters to be used at the RPP-WTP.

TAILORING OF CONCENTRICITY: Concentricity is the condition in which the axes of all cross-sectional elements of a surface of revolution are common to the axis of a datum feature. Concentricity is being replaced with a tolerance for circular runout as a more practical method to verify roundness. Runout refers to the result of rotating a part about its central axis while measuring with a dial indicator its surface deviation from perfect roundness. With circular runout, the dial indicator is not moved along the direction of the axis of the part (as with "total runout"). Circular runout is therefore applied independently at each single circular element along the length of the part as the part is rotated through 360 degrees. The tolerance for circular runout provided in the tailored text controls the cumulative variations that may be present in the positional relationship between the inlet flange and outlet end cap. The 3/32 in. tolerance provided for circular runout will ensure the filter forms an adequate seal within the filter housing.

TAILORING OF GENERAL DESIGN TOLERANCE OF +/- 1/16 IN.: REPLACE: "all other dimensions +/- 1/16 in. " WITH: "all other dimensions +/- 1/16 in. with exception that design filter media to faceguard gap shall be +/- 1/8 in. (i.e., to maintain a minimum media to faceguard gap of 1/8").

Justification: The proposed design is verified to be safe through code required filter qualification testing as described in Section FK-5100.

Section FG Mounting Frames

Not Applicable.

Justification: The ASME Committee on Nuclear Air and Gas Treatment (CONAGT) has stated that Section FG only applies to walk in housings. None of the filter housings (i.e., radial or axial filter designs) to be installed on the RPP-WTP Project is a "walk in" design. Reference ASME Technical Interpretation File # 05-990, RPP-WTP CCN # 107935).

Page 607; Paragraph TA-4632 Airflow Distribution Test (AD)

Revise Paragraph TA-4632 as follows for remote change and safe change radial HEPA housings:

Replace "downstream" with "upstream". Add for clarity: "For Remote Change and Safe Change Radial HEPA filter banks, flow measurement location is upstream vs. code required downstream."

Justification: The requirement for flow measurements to be taken downstream of each HEPA filter in a bank is in order to verify equal flow distribution between filters in a bank. In traditional axial flow systems, a measurement location downstream is preferred due to the improvements in the flow conditions (i.e., flow straightening) inside the housing created by the filter itself. However, due to the difference in configuration created by the radial filter, the flow profile both entering and exiting the filter is extremely complex (i.e., not uniform over the filter face). Testing and analysis (computational fluid dynamic models) performed on prototype units to date have determined that taking the flow measurement upstream and inside the filter (inlet) using a hot wire anemometer provides the most repeatable measurement. Accuracy of the measurement is still hindered by flow conditions and anemometer placement; however, increased precision is obtained by taking an average of multiple measurements at multiple locations within each filter inlet. Predicted results from CFD modeling have agreed with actual field measurements using this technique. The project intends to design (based on the prototype tests) and use an anemometer instrument developed specifically for the radial filter design and place it at the inlet (i.e., upstream) side of the filter. Verification, in the field, of acceptable air distribution between filters in a bank can then be accomplished, as the code requires.

Page 607; Paragraph TA-4633 Air-Aerosol Mixing Test (AA)

Revise Paragraph TA-4633 as follows for axial housings used as LAB C5V Inbleeds:

This article is not applicable to LAB C5V inbleed axial filter housings.

Justification: The intent of this test is to verify that the test aerosol is uniformly mixed in the air stream when it reaches the filter in order to verify that each filter in a filter bank is being challenged. This test is concerned primarily with designs and layouts where a single point injection of aerosol in close proximity to the filter bank may result in non-uniform distribution of the test agent.

The Laboratory Facility C5V Inbleed housing is designed such that each filter is assigned its own aerosol injection manifold. The manifold design and its proximity to the filters have been qualified to meet the aerosol mixing test criteria presented in AG-1. The housing is not designed to accommodate the air-aerosol mixing field-commissioning test per TA-4633. However, the housing design is not being

modified for RPP-WTP use and aerosol mixing, by virtue of the manufacturer test sections, will not be impacted by the installation in the RPP-WTP Laboratory Facility.

Page 111; Section BA-4162 Vibration, Centrifugal Fans

Supplement Section BA-4162 as follows for balancing multi-stage blowers:

Since Section BA-4162 of ASME AG-1 is not applicable for multi-stage blowers used in ventilation/ offgas systems, multi-stage blowers shall be balanced to Quality Grade 2.5 of ISO 1940-1:2003, Mechanical Vibration - Balance Quality Requirements For Rotors in A Constant (Rigid) State - Part 1: Specification And Verification Of Balance Tolerances.

Justification: ASME AG-1 is not applicable for multi-stage blowers. ASME AG-1 Section GC is applicable to multi-stage blowers. However, Section GC is in the course of preparation and is not available for use at this time.

Appendix D

IEEE 384, IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits - *Tailored*

River Protection Project – Waste Treatment Plant
Safety Requirements Document Volume II
24590-WTP-SRD-ESH-01-001-02, Rev 5v

Appendix C: Implementing Standards

19.0 IEEE-384, IEEE Standard Criteria for Independence of Class 1E Equipment and Circuits

Revision: 1992
Sponsoring Organization: The Institute of Electrical and Electronics Engineers, Inc.

RPP-WTP Specific Tailoring

The following tailoring of IEEE-384 is required for use by the RPP-WTP project as an implementing standard for SC or SS electrical equipment and circuit design.

All Sections Clarification of Nuclear Power Generating Station Terminology

The term "Standby Generator" in the Standard is synonymous with "Emergency Generator" in the RPP-WTP.

Justification: As determined by the ISM review process, the Standby Generators on the RPP-WTP are not classified as SC while the Emergency Generators are classified as SC.

Section 2.0, Purpose

Replace with the following:

This standard establishes the criteria for implementation of the independence requirements of IEEE 603-1998 (as tailored in C.33) and IEEE 308-1991 (as tailored in C.18).

Justification: This section was revised to clarify that SRD implementing standards IEEE 603-1998 and IEEE 308-1991 are tailored in Appendix C.

Section 3.0, References

The following reference standards, do not apply for the RPP-WTP.

- [1] ANSI/ANS-58.2-1988, Design Basis for Protection of Light Water Nuclear Power Plants Against the Effects of Postulated Pipe Rupture.

Justification: This document is applicable to the high pressure steam lines found in nuclear power generating stations and doesn't apply for the RPP-WTP.

- [4] ANSI/NFPA 803-1988, Fire Protection for Light Water Nuclear Power Plants.

Justification: This document specifically addresses nuclear power generating stations. Per Section 4.5 of volume II of the SRD, the RPP-WTP will use NFPA 801-2003 as an implementing standard for fire protection.

• [11] IEEE Std 494-1974 (Reaff 1990), IEEE Standard Method for Identification of Documents Related to Class 1E Equipment and Systems for Nuclear Power Generating Stations.

Justification: This standard has been withdrawn by the IEEE standards committee and no replacement standard has been recommended. This standard is not called out as an implementing standard in the SRD. Procedures for identification of documents related to SC or SS equipment will be developed internally for the RPP-WTP project.

Replace the 1991 version of IEEE 603 with the following version.

IEEE Std 603-1998, *IEEE Standard Criteria for Safety Systems for Nuclear Power Generating Stations.*

Justification: SRD Safety Criterion 4.4-4 lists the 1998 version of IEEE 603 as an implementing standard for SC electrical power systems. The 1998 revision of IEEE 603 shall be used in place of the 1991 revision called out as a reference in the body of IEEE 384-1992 for SC electrical power systems only.

The following reference Standards shall be included:

• [16] DOE/RL-96-0006, Revision 1, *Top-level Radiological, Nuclear, and Process Safety Standards and Principles for TWRS Privatization Contractors.*

Justification: Called out as a regulatory basis in the SRD.

• [17] ANSI/ISA-S84.01-1996, *Application of Safety Instrumented Systems for the Process Industries.*

Justification: Replaces IEEE-603 for Control and Instrumentation Systems at the WTP, per 24590-WTP-ABCN-ESH-01-027.

• [18] NFPA 801-2003, *Standard for Fire Protection for Facilities Handling Radioactive Materials.*

Justification: Called out as an implementing standard under safety criteria 4.5-1 through 4.5-4.

Section 4.0, Definitions

• The definition of **design basis events** shall be replaced with the following:

"Postulated events providing bounding conditions for establishing the performance requirements of structures, systems, and components that are necessary to: 1) ensure the integrity of the safety boundaries protecting the worker; 2) place and maintain the facility in a safe state indefinitely; or 3) prevent or mitigate the event consequences so that the radiological exposures to the general public or the workers would not exceed appropriate limits. The Design-Basis Events also establish the performance requirements of the structures, systems and components whose failure under Design-Basis Event conditions could adversely affect any of the above functions."

Justification: This definition is from DOE/RL-96-0006.

Section 5.3, Equipment and Circuits Requiring Independence

Replace with the following sentence:

Equipment and circuits requiring independence shall be determined during the ISM review cycle and shall be identified on documents and drawings in a distinctive manner.

Justification: The reference to IEEE-494 is not applicable since this standard has been withdrawn by the IEEE standards committee and no replacement standard has been recommended. This standard is not called out as an implementing standard in the SRD. The ISM process will provide reliability requirements for each control strategy. These reliability requirements determine when control strategies require independence, redundancy, and seismic qualifications.

Section 6.1.3.2, Area Boundaries

Replace the reference to NFPA 803-1988[4] with NFPA 801-2003 [18].

Justification: Standard NFPA 803-1998 is not applicable for the RPP-WTP. Per Section 4.5 of the SRD, NFPA 801-2003 shall be used for the RPP-WTP.

Section 6.5, Containment Electrical Penetrations

Not applicable for the RPP-WTP.

Justification: Containment electrical penetration assemblies are unique to the containment structure of Nuclear Power Generating Stations and have no equivalent in the RPP-WTP project.