Job No. 24590

Bechtel National, Inc.

SUPPLIER DOCUMENT STATUS

1. [X] **Work may proceed.**
2. [ ] **Revise and resubmit. Work may proceed subject to resolution of indicated comments.**
3. [ ] **Revise and resubmit. Work may not proceed.**
4. [ ] **Review not required. Work may proceed.**

Permission to proceed does not constitute acceptance or approval of design details, calculations, analyses, test methods, or materials developed or selected by the supplier and does not relieve supplier from full compliance with contractual obligations.

REVIEWED										E&NS HMC

G-321 Document Category N/A
[From Supplement A to G-321-E (E) or G-321-V (V), as applicable, or "N/A" if SSRS is used]

Supersedes BNI Document No. N/A Rev. _____
[When applicable]

Accepted by DC Pfingar (Print Name) _____ (Signature) 12/4/03 (Date)

Released by _____ (Print Name) _____ (Signature) _____ (Date)
[When applicable]

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-06
REV. 00A

SUBCONTRACT SUBMITTAL

Best Available Copy

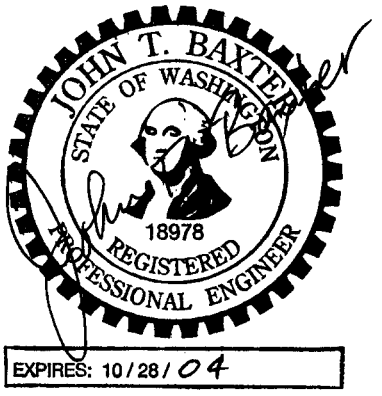
IQRPE REVIEW –
PRETREATMENT FACILITY ULTRAFILTRATION PROCESS SYSTEM (UFP)
ANCILLARY EQUIPMENT

"I, John T. Baxter, have reviewed, and certified a portion of the design of a new tank system or component located at the Hanford Waste Treatment Plant, owned/operated by Department of Energy, Office of River Protection, Richland, Washington. My duties were independent review of the current design for the Pretreatment Facility Ultrafiltration Process System (UFP) Ancillary Equipment as required by the Dangerous Waste Regulations, namely, WAC 173-303-640(3) applicable paragraphs, i.e., (a) through (g)."

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."

The documentation reviewed indicate that the design intent fully satisfies the requirements of the WAC.

The attached review is ten (10) sheets numbered one (1) through ten (10).



John T. Baxter
Signature

12/03/2003
Date

24590-CM-HC4-HXY6-00138-02-06, Rev. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY ULTRAFILTRATION PROCESS SYSTEM (UFP) ANCILLARY EQUIPMENT

COGEMA-IA-025
REV. 1

Please note that source, special nuclear and byproduct materials, as defined in the Atomic Energy Act of 1954 (AEA), are regulated at the U.S. 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.

Scope	Scope of this Integrity Assessment	This integrity assessment includes: a. Ancillary equipment associated with the HLW PTF Ultrafiltration Feed Preparation System Vessels (UFP-VSL-00001A/B) as shown on drawing No. 24590-PTF-M6-UFP-P0001, Rev. 0; b. Ancillary equipment associated with the HLW PTF Ultrafiltration System Vessel (UFP-VSL-00002A) as shown on drawing No. 24590-PTF-M6-UFP-P0002, Rev. 0; c. Ancillary equipment associated with the HLW PTF Ultrafiltration System Vessel (UFP-VSL-00002B) as shown on drawing No. 24590-PTF-M6-UFP-P0003, Rev. 0; d. Ancillary equipment associated with the HLW PTF Ultrafiltration Permeate Collection System Vessels (UFP-VSL-00062A/B/C) as shown on drawing No. 24590-PTF-M6-UFP-P0004, Rev. 0; e. Ancillary equipment associated with the HLW PTF Ultrafiltration Utility Services PSA Racks shown on drawings 24590-PTF-M6-UFP-P0005, Rev. 0; 24590-PTF-M6-UFP-P0006, Rev. 0; 24590-PTF-M6-UFP-P0007, Rev. 0; 24590-PTF-M6-UFP-P0008, Rev. 0; 24590-PTF-M6-UFP-P0009, Rev. 0; 24590-PTF-M6-UFP-P0010, Rev. 0; 24590-PTF-M6-UFP-P0011, Rev. 0; f. Ancillary equipment associated with the HLW PTF Ultrafiltration Utility Services HPS Rack as shown on drawing 24590-PTF-M6-UFP-P0013, Rev. 0; g. Ancillary equipment associated with the HLW PTF Ultrafiltration Utility Services - Plant Wash Rack as shown on drawing 24590-PTF-M6-UFP-P0015, Rev. 0; h. Ancillary equipment associated with the HLW PTF Ultrafiltration Reagents & Process Air Bulge (UFP-BULGE-00001) as shown on drawing No. 24590-PTF-M6-UFP-P0016, Rev. 0 except that bulge UFP-BULGE-00001 is excluded from the scope of this integrity assessment; i. Ancillary equipment associated with the HLW PTF Ultrafiltration Reagents & Process Air Bulge (UFP-BULGE-00002) as shown on drawing No. 24590-PTF-M6-UFP-P0017, Rev. 0 except that bulge UFP-BULGE-00002 is excluded from the scope of this integrity assessment

References	Drawings and System Description	24590-PTF-M5-V17T-P0009, Rev. 0, Process Flow Diagram Ultrafiltration Feed Preparation System UFP; 24590-PTF-M6-UFP-P0001, Rev. 0, P&ID – PTF Ultrafiltration Feed Preparation System Vessels UFP-VSL-00001A/B (Q); 24590-PTF-M6-UFP-P0002, Rev. 0, P&ID – PTF Ultrafiltration System Vessel UFP-VSL-00002A (Q); 24590-PTF-M6-UFP-P0003, Rev. 0, P&ID – PTF Ultrafiltration System Vessel UFP-VSL-00002B (Q); 24590-PTF-M6-UFP-P0004, Rev. 0, P&ID – PTF Ultrafiltration Permeate Collection System Vessels UFP-VSL-00062A/B/C (Q); 24590-PTF-M6-UFP-P0005, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack; 24590-PTF-M6-UFP-P0006, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack; 24590-PTF-M6-UFP-P0007, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack.(Q); 24590-PTF-M6-UFP-P0008, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack (Q); 24590-PTF-M6-UFP-P0009, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack; 24590-PTF-M6-UFP-P0010, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack (Q); 24590-PTF-M6-UFP-P0011, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-PSA Rack (Q); 24590-PTF-M6-UFP-P0013, Rev. 0, P&ID – PTF Ultrafiltration Utility Services HPS Rack; 24590-PTF-M6-UFP-P0015, Rev. 0, P&ID – PTF Ultrafiltration Utility Services-Plant Wash Rack.; 24590-PTF-M6-UFP-P0016, Rev. 0, P&ID – PTF Ultrafiltration Reagents & Process Air BULGE; 24590-PTF-M6-UFP-P0017, Rev. 0, P&ID – PTF Ultrafiltration Reagents & Process Air BULGE; 24590-PTF-3YD-UFP-00001, Rev. 0, System Description for Ultrafiltration Process System (UFP); System Description Change Notice (SDCN), SDCN NO. 24590-PTF-3YN-UFP-00001 for System Description Number 24590-PTF-3YD-UFP-00001, Rev. 0, System Description for Ultrafiltration Process System (UFP)

Summary of Assessment

For each item of "Information Assessed" (i.e., Criteria) on the following pages, the items listed under "Source of Information" were reviewed and found to furnish adequate design controls and requirements to assure the design intent fully satisfies the WAC requirements.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers	The Pipe Stress Design Criteria document identifies ASME B31.3 as the design code for piping systems of the WTP. The P&ID drawings (P0001 through P0004) show that the main process piping in this system is Quality Level (QL-1) and Seismic Category (SC-1) to ensure containment of waste during normal operations, abnormal operations, and during and after a Design Basis Earthquake. Much of the equipment shown on the Plant Service Air (PSA) Rack P&ID drawings (P0005 through P0013) is Quality Level (QL-2), Seismic Category (SC-II). Plant Wash Rack ancillary equipment shown on P&ID drawing (P0015) is Quality Level (CM), commercial grade, and Seismic Category (SC-III). These Seismic Categories are discussed in detail in the Pipe Stress Design Criteria document. These codes and standards are acceptable and adequate for the design of the ancillary equipment for the intended service.
	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"	The ancillary equipment is built to design standards. The Pipe Stress Design Criteria document specifies that piping is to be designed in accordance with ASME B31.3.

	Information Assessed	Source of Information	Discussion
Design	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NC, Appendix N and Appendix F, 1995; 24590-WTP-VV-PS-01-001, Rev. 1, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N6	The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code for piping design. ASME B31.3 requires explicit consideration of many loadings including operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. Elements of the ASME B&PV Code, Section III, Division 1, Subsection NC, Appendix N and Appendix F are used to supplement the requirements of ASME B31.3 for seismic design of SC-I/SC-II piping. Similarly, ASME B&PV Code, Section III, Division 1, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 for seismic design of SC-III/SC-IV piping. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria document. Design is by hand calculations and computer codes that have been tested and approved as discussed in the Verification and Validation Report for ME101, Linear Elastic Analysis of Piping, Version N6. These are adequate and appropriate codes and standards to ensure that the ancillary equipment will have adequate strength at end of design life to withstand all anticipated loadings.

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	Drawings - see references above; 24590-WTP-DC-PS-01-002, Rev 2, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Rules for Construction of Nuclear Facility Components, Division 1, Subsection NF and Appendix F, 1995; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS)	The Pipe Support Design Criteria considers all load types identified in ASME B31.3 and utilizes ASME Section III, Division 1, Subsection NF and Appendix F to supplement the requirements of ASME B31.3 for seismic design of SC-I/II and SC-III/IV pipe supports. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Details of the seismic design methodology are discussed in the Pipe Support Design Criteria document. Design is by hand calculations and computer programs that have been tested and approved as discussed in the Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS). The Ancillary Equipment Pipe Support Design document shows examples of typical equipment supports. These are appropriate codes and standards for design of the UFP system ancillary equipment supports. Ancillary equipment supports are to be designed to allow a minimum of heat to be transferred to the building structures (building structures not to exceed 150 deg F for concrete and 200 deg F for steel). Design standards for vessel internal equipment supports are discussed in the integrity assessment for the UFP system vessels.

	Information Assessed	Source of Information	Discussion
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 1, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"; ASME Boiler and Pressure Vessel Code, Section IX, Welding and Brazing Qualifications; 24590-WTP-3PS-PF00-T0001, Rev. 1, Engineering Specification for Process Jumper Fabrication for PT and HLW	The Basis of Design states that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria document specifies the ASME B31.3 Process Piping design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 and the ASME B&PV Code, Section IX. ANSI B 16.5 is specified for flange designs where flanges are acceptable for use. Remote handled piping connections in the central hot cell are made using jumpers fabricated in accordance with the Engineering Specification for Process Jumper Fabrication for PT and HLW. These are appropriate codes and standards for design and fabrication of the UFP system ancillary equipment.
Supports	The system will withstand the effects of frost heave.	System Description and SDCN listed above under References; 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria	The ancillary equipment associated with the UFP system considered in this assessment is located in a central hot cell, adjacent inaccessible process cells, and surrounding R2/C3 platform areas at various elevations inside the PTF. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line to preclude frost heave. The frost line is 30 in. below grade. The PTF building foundations are not subject to frost heave; therefore, the ancillary equipment located inside the building is not subject to frost heave.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, temperature)	24590-WTP-PSAR-ESH-01-002-02, Rev. 1, Preliminary Safety Analysis Report (PSAR) to Support Construction Authorization; PT Facility Specific Information; System Description and SDCN listed above under References	The PSAR provides a summary of potential hazardous conditions associated with each PTF vessel and the associated ancillary equipment. Design provisions for control of these hazards are listed in the PSAR and the individual System Descriptions. The UFP System Description identifies the only safety function for ancillary equipment as providing primary confinement of the wastes during normal operations, upset conditions and during and after a SC-I/II Design Basis Seismic Event. Ancillary equipment that must remain functional during and after a design earthquake is Quality Level (QL-1) and Seismic Category (SC-I). This ancillary equipment includes the main process transfer lines located below the UFP tank overflow levels and the ancillary equipment required to provide for post earthquake hydrogen control in vessels UFP-VSL-00001A/B and UFP-VSL-00002A/B.
	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-PTF-N1D-UFP-P0001, Rev. 0, Vessel/Tank Material Selection Data Sheet, UFP-BRKPT-00001A/B (PTF) Ultrafiltration Recycle Breakpot; 24590-PTF-N1D-UFP-P0002, Rev. 0 Plant Item Material Selection Data Sheet, UFP-PP-00001, 2, 3 A/B (PTF) Ultrafilter Pulsepots; System Description and SDCN listed above under References	The System Description indicates that the UFP system removes entrained solids and Sr (strontium)/TRU (Transuranic elements) from a combined HLW and LAW feed that meets certain envelope definitions. A partial listing of the reagents used in this process includes Sodium Hydroxide, Nitric Acid, Sodium Permanganate and Strontium Nitrate. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. Material selection for the UFP Breakpots is documented in the Vessel/Tank Material Selection Data Sheet. Material selection for the UFP Pulsepots is documented in the Plant Item Material Selection Data Sheet.

	Information Assessed	Source of Information	Discussion
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	System Description and SDCN listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1, Basis of Design; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-PTF-N1D-UFP-P0001, Rev. 0, Vessel/Tank Material Selection Data Sheet, UFP-BRKPT-00001A/B (PTF) Ultrafiltration Recycle Breakpot; 24590-PTF-N1D-UFP-P0002, Rev. 0 Plant Item Material Selection Data Sheet, UFP-PP-00001, 2, 3 A/B (PTF) Ultrafilter Pulsepots; 24590-WTP-3PS-NN00-T0001, Rev 0, Engineering Specification for Hot and Anti-Sweat Thermal Insulation	The Basis of Design identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. Detailed material selection (corrosion) analyses are conducted for each vessel in the PTF during process design. The Materials for Ancillary Equipment document requires that the material selection and corrosion/erosion allowances for ancillary equipment in contact with the waste will be equal to or better than the material and corrosion allowance of the waste source vessel. Material selection considerations for the Breakpots are documented in the Vessel/Tank Material Selection Data Sheet. Material selection considerations for the Pulsepots are documented in the Plant Item Material Selection Data Sheet. The Thermal Insulation specification requires that all insulating materials used on the outside of ancillary equipment be pre-approved for use on austenitic stainless steel in accordance with applicable ASTM procedures and tests to preclude external corrosion of ancillary equipment. Corrosion allowances are considered for all ancillary equipment, therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"; 24590-WTP-DB-ENG-01-001, Rev 1, Basis of Design; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 2, Piping Material Class Description; Vessel/Tank Material Selection Data Sheet, UFP-BRKPT-00001A/B (PTF) Ultrafiltration Recycle Breakpot; 24590-PTF-N1D-UFP-P0002, Rev. 0 Plant Item Material Selection Data Sheet, UFP-PP-00001, 2, 3 A/B (PTF) Ultrafilter Pulsepots	The Pipe Stress Design Criteria document requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion, including corrosion allowance, is a mandatory requirement of ASME B31.3. A required service life of 40 years is identified in the Basis of Design for ancillary equipment located in the central hot cell and adjacent inaccessible process cells. Detailed material selection (corrosion) analyses are conducted for each vessel in the PTF during process design. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials than the source vessel, and with the same corrosion allowance as the source vessel. Bounding corrosion allowances are listed for each piping material class in the Piping Material Class Description document. The Vessel/Tank Material Selection Data Sheet for the UFP system Breakpots identifies the preferred Breakpot material and a recommended corrosion allowance. The Breakpots are equipped with internal wash rings for decontamination purposes as noted on the Process Flow Diagram. The Plant Item Material Selection Data Sheet identifies the preferred Pulsepot material and a recommended corrosion allowance.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"	The Pipe Stress Design Criteria document specifies use of ASME B31.3 as the design code for the WTP piping. ASME B31.3 requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 piping not protected by a pressure relieving device, or that can be isolated from a pressure reliving device must be designed for at least the highest pressure that can be developed.

	Information Assessed	Source of Information	Discussion
Strength	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev 2, Pipe Stress Design Criteria including "Pipe Stress Criteria"and "Span Method Criteria"; 24590-WTP-PER-PL-02-001, Rev. 2, Piping Material Class Description	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria document specifies the ASME B31.3 code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. The Piping Material Class Description document lists the bounding pressure and temperature limits for each piping material class.
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings and System Description listed above under References; 24590-WTP-DB-ENG-01-001, Rev 1, Basis of Design	The ancillary equipment considered in this assessment is located in a central hot cell, adjacent inaccessible process cells, and surrounding R2/C3 platform areas at various elevations within the Pretreatment facility. Secondary containment for ancillary equipment within the cells is provided by the liners and sumps within the cells which are outside the scope of this integrity assessment. Secondary containment for ancillary equipment located in R2/C3 areas is provided by special protective coatings, curbs, and sumps or regulated drain systems which are also outside the scope of this integrity assessment. The Basis of Design specifies: "All secondary containments will be provided with drains and leak detection systems for detection of primary containment leaks."