Job No. 24590

Bechtel National, Inc.

SUPPLIER DOCUMENT STATUS

1. **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.

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										EGWS

G-321 Document Category N/A
[From Supplement A to G-321 (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 Dan Pfluger (Print Name) (Signature) 9/3/03 (Date)

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

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

SUBCONTRACT SUBMITTAL

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(A) KJ 9/3/03

(C) Sump 9/5/03

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COGEMA ENGINEERING

COGEMA-IA-019, Rev. 1

RPP-WTP
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IQRPE REVIEW – PRETREATMENT FACILITY WASTE FEED RECEIPT SYSTEM (FRP) ANCILLARY EQUIPMENT, REV. 1

"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 Waste Feed Receipt System (FRP) 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 eight (8) sheets numbered one (1) through eight (8).

JOHN T. BAXTER
STATE OF WASHINGTON
18978
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 10/28/04

John T. Baxter
Signature

09/02/2003
Date

9-3-03

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

SJ 9/3/03

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY WASTE FEED RECEIPT SYSTEM (FRP) ANCILLARY EQUIPMENT

COGEMA-IA-019
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.

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Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses ancillary equipment for the Pretreatment Facility (PTF) Waste Feed Receipt (FRP) Process System Vessels. The FRP vessels (FRP-VSL-00002A/B/C/D) and ancillary equipment are located in a central hot cell, inaccessible process cells, and surrounding R3/C3 areas in the Pretreatment Facility. Ancillary equipment located inside the FRP system vessels is addressed separately in the Integrity Assessment for the vessels. Direct buried coaxial transfer lines located outside the Pretreatment Facility are outside the scope of this Integrity Assessment.
	Drawings	24590-PTF-M5-V17T-P0003, Rev. 0, Process Flow Diagram Waste Feed Receipt System FRP; 24590-PTF-M6-FRP-P0001, Rev. 0, P&ID - PTF Waste Feed Receipt Vessels FRP-VSL-00002B (Q); 24590-PTF-M6-FRP-P0002, Rev. 0, P&ID - PTF Waste Feed Receipt Vessels FRP-VSL-00002C and FRP-VSL-00002D (Q); 24590-PTF-M6-FRP-P0003, Rev. 0, P&ID - PTF Waste Feed Receipt Process System FRP-PMP-00001 and FRP-PMP-00002A (Q); 24590-PTF-M6-FRP-P0005, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems - PSA Rack (Q); 24590-PTF-M6-FRP-P0006, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems - PSA Rack (Q); 24590-PTF-M6-FRP-P0007, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems - PSA Rack (Q); 24590-PTF-M6-FRP-P0008, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems - PSA Rack (Q); 24590-PTF-M6-FRP-P0009, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems Plant Wash Rack; 24590-PTF-M6-FRP-P0010, Rev. 0, P&ID - PTF Waste Feed Receipt Utility Systems - Plant Wash Rack

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.	24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; 24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); Drawings listed above under Scope; ASME B31.3 Code, Process Piping, 1996 Edition, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NC, Appendix N and Appendix F, 1995 Edition; American Society of Mechanical Engineers; Uniform Building Code (UBC), 1997, International Conference of Building Officials, Whittier, California	The Pipe Stress Design Criteria identifies ASME B31.3 as the design code for piping systems of the WTP. Ancillary equipment that performs a safety function during an earthquake and ancillary equipment that that must not fail during an earthquake are classified as Seismic Category (SC-I) and Seismic Category (SC-II) respectively. Elements of the ASME B&PV Code, Section III, Subsection NC, Appendix N and Appendix F, are used to supplement the design rules of ASME B31.3 Code for seismic design analysis of SC-I and SC-II piping. Ancillary equipment important to safety without a seismic safety function is classified as Seismic Category (SC-III). The UBC is used to supplement the requirements of ASME B31.3 for seismic design analysis of Seismic Category SC-III/IV ancillary equipment. Table 1 in the Pipe Stress Design Criteria document describes the seismic categories for piping, applicable design codes and analysis methods, seismic loads, and design acceptance criteria. The codes and standards identified in Table 1 are appropriate for design of piping containing mixed waste over the range of conditions identified for the FRP system.
	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 1, Pipe Stress Design Criteria; 24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria.	The ancillary equipment is built to designs based on the ASME B31.3 Process Piping code supplemented by ASME B&PV Code, Section III as identified in the Pipe Stress Design Criteria. The piping supports are designed using load ratings for component standard type pipe supports and are otherwise designed using allowable stress limits from ASME B&PV Code, Section III.

	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 1, Pipe Stress Design Criteria; 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design.	The Pipe Stress Design Criteria requires the use of the ASME B31.3 code for piping design. ASME B31.3 requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. Selected elements of the ASME B&PV Code, Section III are specified to provide appropriate seismic design requirements to supplement the provisions of ASME B31.3. The Basis of Design document specifies that mechanical equipment is to be designed for a nominal plant life of 40 years. Components in non-maintainable areas are to be designed to last the entire design life of the plant. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the PTF facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document uses a conservative design approach specifying that ancillary equipment downstream of a waste source vessel is to be constructed of the same or better material and with the same corrosion allowance as the source vessel itself. Since the vessels all have detailed corrosion analyses, using the same or better materials for downstream piping ensures that the material will be appropriate for the wastes for the entire design life. If the material for the ancillary equipment is to be different from the source vessel, a supplementary corrosion analysis by the materials group is required (Materials for Ancillary Equipment).

	Information Assessed	Source of Information	Discussion
Supports	Ancillary equipment supports are adequately designed.	24590-WTP-DC-PS-01-002, Rev 1, Pipe Support Design Criteria; ASME Boiler and Pressure Vessel Code, Section III, Division 1, Subsection NF, and Appendix F, 1995 Edition; 24590-WTP-PL-PS-01-001, Rev 1, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-WTP-VV-PS-01-001, Rev 1, Verification and Validation Report for ME101, Linear Elastic Analysis of Piping Version N6	The Pipe Support Design Criteria considers all loadings identified in ASME B31.3 and utilizes ASME B&PV Code, Section III, Division 1, Subsection NF and Appendix F, to supplement the requirements of ASME B31.3 for seismic design of Seismic Category 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. Analysis is by manual calculation or approved computer programs that have been verified and validated. These are appropriate codes and standards for design of ancillary equipment supports for a mixed waste piping system over the range of conditions identified for the FRP system. 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 FRP system tanks.
Connections	Seams and connections are adequately designed.	24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria.	The Basis of Design states that hot cell, inaccessible process cell, and service piping connections will be designed to minimize the potential for liquid waste leakage or seepage when disconnected. It also specifies that in-cell pipework 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 B16.5 is specified for flange designs. These are appropriate codes and standards for design and fabrication of the aqueous mixed waste FRP ancillary equipment.

	Information Assessed	Source of Information	Discussion
Supports	The system will withstand the effects of frost heave.	24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-DC-ST-01-001, Rev. 1, Structural Design Criteria	The FRP system ancillary equipment considered in this assessment is located inside the Pretreatment Facility. 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. Therefore the ancillary equipment is not subject to the effects of frost heave.
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. 0, Preliminary Safety Analysis Report to Support Construction Authorization; PT Facility Specific Information; 24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-PER-PL-02-001, Rev. 2, Piping Material Class Description; 24590-WTP-3PS-PF00-T0001, Rev. 1, Engineering Specification for Jumper Fabrication for PT and HLW	The FRP System Description states that the primary functions of the FRP system are to receive LAW waste feed through the transfer pipelines, provide lag storage for the waste feed, and to pump feed to different processes in the Pretreatment Facility. These system tanks can also receive, store and transfer HLW waste feed, treated LAW concentrate, and other recycle streams. Waste received must have a storage temperature below 120 °F with a solids concentration below 5 wt%. The ancillary equipment considered in this assessment will handle wastes with the same characteristics as do the source vessels. Operating pressures for ancillary equipment will be different from those of the vessels. Enveloping pressures and temperatures are reflected in the Piping Material Class assigned to each pipe run. The Preliminary Safety Analysis Report (PSAR) provides a summary of potential hazardous conditions associated with each Pretreatment Facility vessel and the design provisions that are to be used to provide adequate control of each hazard. Design provisions for control of these hazards are listed in the PSAR. For example, the Pretreatment Vessel Vent Process System provides flammable gas dilution and control in the FRP tank head spaces and ancillary equipment. A facility wide grounding system is furnished to control ignition sources in these same tanks and ancillary equipment.

	Information Assessed	Source of Information	Discussion
Waste Char.	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.	As noted in the adjacent entry above, source vessels are designed to store the waste and treatment reagents (if any) that they receive. The ancillary equipment materials that contact the waste are to be equal to or better than those of the upstream source vessels.
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.	24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 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 materials selection (corrosion) evaluations are conducted for each vessel in the PTF facility during process design to assure a 40 year service life. 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. 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 the 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.	24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-PER-M-02-002, Rev 0, Materials for Ancillary Equipment; 24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria; 24590-WTP-PER-PL-02-001, Rev. 2, Piping Material Class Description	ASME B31.3 is the code for the WTP piping. 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 inaccessible process cells. Detailed materials selection (corrosion) evaluations are conducted for each vessel in the PTF facility during process design to assure a 40 year service life. The Materials for Ancillary Equipment document requires that downstream ancillary equipment is to be constructed of equal or better materials, and with the same corrosion allowance as the source vessel. Corrosion/Erosion allowances are listed for each Piping Material Class in the Piping Material Class Description document.
Strength	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	24590-WTP-DC-PS-01-001, Rev. 1, Pipe Stress Design Criteria.	Pressure controls related to the FRP vessels themselves are discussed in their structural integrity assessments. ASME B31.3 is 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 in the piping system.
	Maximum flows and any unusual operating stresses are identified	Drawings listed above under Scope; 24590-WTP-DC-PS-01-001, Rev 1, Pipe Stress Design Criteria	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria 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 while assuring that maximum operating stresses remain within code allowables.

	Information Assessed	Source of Information	Discussion
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.	24590-PTF-3YD-FRP-00001, Rev 0, System Description for Waste Feed Receipt Process (FRP); 24590-WTP-DB-ENG-01-001, Rev 0, Basis of Design.	The ancillary equipment considered in this assessment is located in a central hot cell, process cells and surrounding R3/C3 areas 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 in the R3/C3 areas is provided by special protective coatings, curbs and regulated drain systems which are also outside the scope of this integrity assessment. All secondary containments will be provided with drains and leak detection systems for the detection of primary containment leaks as discussed in the Basis of Design document.

COGEMA ENGINEERING

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BNI-Subcontracts

September 2, 2003

COGEMA-03-0266

Daisy J. Whiting
Bechtel National, Inc.
Waste Treatment Plant
2435 Stevens Center
Richland, Washington 99352

Dear Ms. Whiting:

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY WASTE FEED RECEIPT SYSTEM (FRP) ANCILLARY EQUIPMENT, REV. 1

The integrity assessment has been completed per the contract requirements and is attached for your use. The assessment found the design intent is sufficient to ensure the ancillary equipment will be adequately designed and that the ancillary equipment will have sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection to ensure that they will not collapse, rupture, or fail.

If you have any questions, please contact me at (509) 376-5445, or via facsimile at (509) 372-0504.

Sincerely,

K. V. Scott, Manager
Facilities, Structures & Components

jb

Attachment

cc: D. C. Pfluger MS4-E2 w/ attachment

2425 Stevens Center Place, Second Floor, Richland, Washington 99352 Tel: (509) 372-3572 - Fax: (509) 372-3169
COGEMA Engineering Corporation