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

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 Pflugrad DC Pflugrad 7/28/04
Print Name Signature Date

Released by N/A _____ _____
[When applicable] Print Name Signature Date

416 GP&S 7-03

24590-CM-HC4-HXYG-00138-02-03
REV. 00B

SUBCONTRACT SUBMITTAL

Best Available Copy

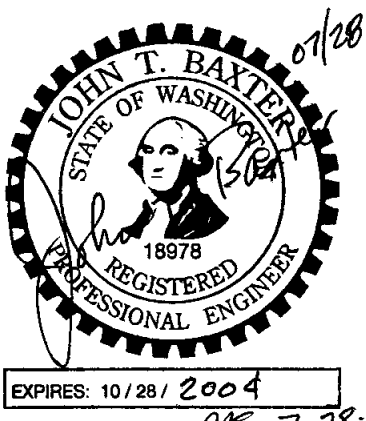
IQRPE REVIEW -
PRETREATMENT FACILITY (PTF) WASTE FEED RECEIPT PROCESS VESSELS FRP-VSL-00002A, -00002B, -00002C & -00002D, REV. 2

"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 (PTF) Waste Feed Receipt Process Vessels FRP-VSL-00002A, -00002B, -00002C & -00002D 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 indicates that the design intent fully satisfies the requirements of the WAC.

The attached review is eight (8) pages numbered one (1) through eight (8).



07/28/04

24590-CM-HC4-HXYG-00138-02-~~00039, REV. 00A~~ 03, REV. 00B

7-28-04

John T. Baxter
Signature

07/28/2004
Date

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY (PTF) WASTE FEED RECEIPT PROCESS VESSELS FRP-VSL-00002A, -00002B, -00002C & -00002D

COGEMA-IA-020
Rev. 2

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: The four Waste Feed Receipt Process Vessels; FRP-VSL-00002A, FRP-VSL-00002B, FRP-VSL-00002C and FRP-VSL-00002D which are located in inaccessible process cells in the Pretreatment Facility.
References	Drawings, Mechanical Data Sheets, Subcontracts and Change Notices	24590-PTF-M2-FRP-00001, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel (FRP-VSL-00002A); 24590-PTF-M2-FRP-00002, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel (FRP-VSL-00002B); 24590-PTF-M2-FRP-00003, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel (FRP-VSL-00002C); 24590-PTF-M2-FRP-00004, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel (FRP-VSL-00002D); Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00005 to Drawing No. 24590-PTF-M2-FRP-00001, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002A; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00013 to Drawing No. 24590-PTF-M2-FRP-00001, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002A; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00006 to Drawing No. 24590-PTF-M2-FRP-00002, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002B; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00014 to Drawing No. 24590-PTF-M2-FRP-00002, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002B; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00007 to Drawing No. 24590-PTF-M2-FRP-00003, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002C; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00015 to Drawing No. 24590-PTF-M2-FRP-00003, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002C; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00008 to Drawing No. 24590-PTF-M2-FRP-00004, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002D; Drawing Change Notice (DCN) No. 24590-PTF-M2N-FRP-00016 to Drawing No. 24590-PTF-M2-FRP-00004, Rev. 2, Equipment Assembly Waste Feed Receipt Vessel FRP-VSL-00002D; 24590-WTP-MV-M59T-00004, Rev. 2, Pulse Jet Mixers Standard Details; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-FRP-00005, Rev. 9, FRP-VSL-00002-A, Waste Feed Receipt Vessel; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-FRP-00006, Rev. 9, FRP-VSL-00002-B, Waste Feed Receipt Vessel; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-FRP-00007, Rev. 9, FRP-VSL-00002-C, Waste Feed Receipt Vessel; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-FRP-00008, Rev. 9, FRP-VSL-00002-D, Waste Feed Receipt Vessel; Document No. 24590-WTP-3PS-MV00-T0001, Rev. 1, Pressure Vessel Design and Fabrication;

References	Change Notices, Subcontract Documentation and Submittals (Calculations)	Specification Change Notice (SCN) No. 24590-WTP-3PN-MV00-00009 to 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication; Subcontract No. 24590-QL-SRA-MTF5-00001, Rev. 4 (July 19, 2004), Waste Feed Receipt Vessels (4-Pack & SS liner), including Exhibit "E" Technical Specifications, Rev. 3; CBI Design Submittals: 24590-QL-SRA-MTF5-00001-31-01, Rev. 00E, SECTION "S" Source for design information for the Waste Feed Receipt Vessels and PJM vessels; 24590-QL-SRA-MTF5-00001-01-02, Rev. 00F, Waste Feed Receipt Vessels FRP-VSL-00002A to -00002D, Design Calculations; 24590-QL-SRA-MTF5-00001-06-31, Rev. 00C, Seismic Analysis of Waste Feed Receipt Vessel; 24590-QL-SRA-MTF5-00001-06-32, Rev. 00A, Waste Feed Receipt Vessels Wash Ring Structural Design; 24590-QL-SRA-MTF5-00001-01-01, Rev. 00D, Pulse Jet Mixers Vessels FRP-PJM-0001-36 & 61-72; 24590-QL-SRA-MTF5-00001-30-01, Rev. 00D, Pulse Jet Mixers Structural Steel Supports Vessel No: FRP-VSL-00002A to 00002D; 24590-QL-SRA-MTF5-00001-30-02, Rev. 00C, Pulse Jet Mixers Structural Steel Supports: Attachment A Input for RISA Analysis; 24590-QL-SRA-MTF5-00001-30-03, Rev. 00C, Pulse Jet Mixers Structural Steel Supports: Attachment B Output of RISA Analysis; 24590-QL-SRA-MTF5-00001-30-04, Rev. 00C, Pulse Jet Mixers Structural Steel Supports: Attachment C Single Angle Design According to AISC, ASD 9th Ed.; 24590-QL-SRA-MTF5-00001-30-06, Rev. 00C, Pulse Jet Mixers Structural Steel Supports: Attachment E Shell of Revolution PJM Ring Stress Analysis E0781A; 24590-QL-SRA-MTF5-00001-30-07, Rev. 00C, Pulse Jet Mixers Structural Steel Supports: Attachment F Structural Support Connection Design; 24590-QL-SRA-MTF5-00001-40-00003, Rev. 00C, WFR Vessels, Section 8, Dip Leg and Outlet Line N18, N21, N22, N63, N70A, N70B, N70C Structural Steel Supports; 24590-QL-SRA-MTF5-00001-40-00004, Rev. 00A, Pulse Jet Mixers Structural Steel Supports: Attachment G PJM's Hydrodynamic Loading, Attachment G.A RISA output

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	Assessment
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Drawings, Mechanical Data Sheets and Change Notices listed above under references; 24590-PTF-3YD-FRP-00001, Rev. 0, System Description for Waste Feed Receipt Process (FRP); SDCN No. 24590-PTF-3YN-FRP-00001, Rev. 0, to 24590-PTF-3YD-FRP-00001, Rev. 0; 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0003, Rev. 2, Engineering Specification for Pressure Vessel Fatigue Analysis; 24590-WTP-3PS-MVB2-T0001, Rev. 1, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers and Boilers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternative Rules, American Society of Mechanical Engineers	The FRP system Waste Feed Receipt Process Vessels (FRP-VSL-00002A through 00002D) and all vessel appurtenances are to be designed to the ASME B&PV Code, Section VIII, Division 1 rules, which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for these vessels. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and packaging, shipping, handling and storage requirements. Some of the vessel internal equipment is subject to cyclic loading. The fatigue design analyses for the vessels and internal equipment (e.g., pulse jet mixers) are adequate. The fatigue design standards, ASME Section VIII, Division 2, are appropriate for components with a high number of load cycles. The FRP Waste Receipt Vessels (FRP-VSL-00002A through 00002D) are vertical vessels with a 564 in. ID and a vertical length of 322 in. tangent to tangent supported on cylindrical skirts. Top and bottom heads are torispherical shells with a minimum thickness of 1 3/16 in. The shells are specified to have a minimum thickness of 1 inch. Materials for the shells, heads and vessel's internal equipment are SA 240 316L stainless steel (max. 0.030% carbon) dual certified, hereinafter referred to as 316L stainless steel. The skirts are to be SA-240 304L stainless steel (max. 0.030% carbon) dual certified, hereinafter referred to as 304L stainless steel. The operating volume is to be about 406,800 gallons and the total internal volume is to be about 474,000 gallons.

	Information Assessed	Source of Information	Assessment
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Drawings, Mechanical Data Sheets and Change Notices listed above under references; 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers	The FRP Waste Feed Receipt Vessels (FRP-VSL-00002A-D) are standard ASME B&PV Code, Section VIII, Division 1 vessels. The Mechanical Data Sheets require that the vessels be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Because of their size, these vessels are to be field erected from shop fabricated subassemblies at the construction site for the PTF. The Subcontract Submittals were reviewed for all load cases and load combinations specified in the applicable design requirements. In all cases, the computed maximum stresses are within the allowable code limits. As discussed in the item immediately above, the vessel design standards are appropriate and adequate for the vessels' intended use.

	Information Assessed	Source of Information	Assessment
Design	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Drawings, Mechanical Data Sheets and Change Notices listed above under references; 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0002, Rev. 2, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-SS90-T0001, Rev. 0, Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Vessels; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternative Rules, American Society of Mechanical Engineers	The Mechanical Data Sheets identify each vessel's operating pressure and temperature ranges, the materials selected for each vessel, the corrosion allowance(s), and the vessel quality levels, which determine the requirements for seismic design. The design specifications for the vessels require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B&PV Code, Section VIII, Division 1 requires that corrosion allowance material not be considered when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME B&PV Code, Section VIII, Div. 2 design rules to supplement the Division 1 rules to address seismic design and analysis of the vessels. Detailed requirements for seismic design of SC-I/II vessels are furnished in the specification for Seismic Qualification of Seismic Category I/II Equipment and Vessels. These codes and standards are adequate and appropriate for design and construction of the FRP Waste Feed Receipt vessels to withstand anticipated operating pressure and temperature loads and seismic loads for the specified design life.
Foundations	Vessel foundation will maintain the load of a full vessel.	Drawings and Change Notices listed above under references; 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication	The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV code, Section VIII, Division I for design of the vessel skirts. This code assures an adequate design for the vessel skirts because it requires that vessel foundations design must be adequate to support the loads from full vessels.
	If in an area subject to flooding, the vessel is anchored.	Drawings and Change Notices listed above under References; 24590-WTP-3PS-MV00-T0001, Rev. 1, Engineering Specification for Pressure Vessel Design and Fabrication	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in this specification for Pressure Vessel Design and Fabrication.

	Information Assessed	Source of Information	Assessment
Frost Heave	Vessel system will withstand the effects of frost heave.	24590-WTP-DB-ENG-01-001, Rev. 1B, Basis of Design	The Basis of Design document requires that all structural foundations extend a distance below grade that exceeds the depth of the frost line in order to preclude frost heave. Therefore, the vessels are not subject to 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, storage temperature)	Mechanical Data Sheets listed above under references; Plant Item Material Selection Data Sheet, 24590-PTF-N1D-FRP-P0001, Rev. 2, FRP-VSL-00002A-D (PTF) Waste Feed Receipt Vessels; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit System; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems	The Mechanical Data Sheets present the waste specific gravity, storage temperatures and pressures. The Vessel Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, flash point, and toxicity are addressed by the Toxic Vapors and Emissions from WTP Tank Systems document and the Prevention of Hydrogen Accumulation in WTP Tank Systems document. The FRP vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessels must retain integrity to insure that the hydrogen controls for the vessel head space continue functioning to provide for air purge, dilution and mixing during normal operations, abnormal operations and during and after a Design Basis Earthquake.
	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Plant Item Material Selection Data Sheet, 24590-PTF-N1D-FRP-P0001, Rev. 1, FRP-VSL-00002A-D (PTF) Waste Feed Receipt Vessels; 24590-PTF-3YD-FRP-00001, Rev. 0, System Description for Waste Feed Receipt Process (FRP); SDCN No. 24590-PTF-3YN-FRP-00001, Rev. 0, to 24590-PTF-3YD-FRP-00001, Rev. 0	The Vessel Material Selection Data Sheet demonstrates that the vessel is designed to store the wastes discussed above. The System Description discusses normal and abnormal operations for the FRP vessels (FRP-VSL-00002A-D). Reagents will not routinely be added to these vessels.

	Information Assessed	Source of Information	Assessment
Waste Char.	The waste types are compatible with each other.	24590-PTF-3YD-FRP-00001, Rev. 0, System Description for Waste Feed Receipt Process (FRP); SDCN No. 24590-PTF-3YN-FRP-00001, Rev. 0, to 24590-PTF-3YD-FRP-00001, Rev. 0	The System Description for the Waste Feed Receipt Process does not describe any operations where incompatible wastes are mixed in these vessels for processing. The FRP vessels function primarily as lag storage for bringing waste from the Hanford tank farms into the Pretreatment facility for processing by other PTF systems.
Corrosion Protection	Vessel material and protective coatings ensure the vessel structure is adequately protected form the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	Drawings, Mechanical Data Sheets and Change Notices listed above under references; Plant Item Material Selection Data Sheet, 24590-PTF-N1D-FRP-P0001, Rev. 1, FRP-VSL-00002A-D (PTF) Waste Feed Receipt Vessels; 24590-PTF-3YD-FRP-00001, Rev. 0, System Description for Waste Feed Receipt Process (FRP); SDCN No. 24590-PTF-3YN-FRP-00001, Rev. 0, to 24590-PTF-3YD-FRP-00001, Rev. 0	The Plant Item Material Selection Data Sheet shows that the FRP vessels (FRP-VSL-00002A-D) normally operate at, or above pH 12 at a temperature of between 60 and 120 °F. Potential abnormal operations up to 240 °F and acid cleaning operations of the vessels were also considered. The vessels material was selected as 316L stainless steel with a corrosion allowance of 0.04 in. The System Description discusses a maximum receiving temperature for normal operations of 120 °F with solids content below 5 wt%. The vessels are equipped with internal wash rings for decontamination as shown on the drawings. The FRP vessels are located in cells P-0108, P-0108A, P-0108B, and P-0108C at elevation 0 ft. in the PTF. These cells are equipped with liners and sumps to contain potential leaks. The FRP vessels are designed to overflow to the PWD ultimate overflow vessel (PWD-VSL-00033). Therefore, the cells should remain dry during normal operations which will limit external corrosion of the vessels over the facility design life.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Plant Item Material Selection Data Sheet, 24590-PTF-N1D-FRP-P0001, Rev. 2, FRP-VSL-00002A-D (PTF) Waste Feed Receipt Vessels; Mechanical Data Sheets listed above under references.	The bases for the FRP vessels material selection and corrosion allowance is furnished in the Plant Item Material Selection Data Sheet. Selection of 316L stainless steel with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheets consistently and correctly.

	Information Assessed	Source of Information	Assessment
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings and Change Notices listed above under references;	The FRP vessels are designed to overflow to the PWD ultimate overflow vessel (PWD-VSL-00033) located at elevation (-) 45'-0". The unrestricted overflow lines are sized 8 in. diameter as shown on the drawings and are adequate to prevent over pressurization of the vessels.