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STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY (PTF) TREATED LAW EVAPORATION PROCESS (TLP) SYSTEM LAW SBS CONDENSATE RECEIPT VESSELS (TLP-VSL-00009A&B)

BECHTEL

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									

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 D C Pfluger _____ 1/31/05
Print Name Signature Date

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416 GP&S 7-03

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.

24590-CM-HC4-HXYG-00188-02-00054 Rev. 00A

IQRPE REVIEW
OF
THE PRETREATMENT FACILITY (PTF) TREATED LAW EVAPORATION PROCESS (TLP) SYSTEM LAW SBS CONDENSATE RECEIPT VESSELS (TLP-VSL-00009A&B)

"I, Tarlok Hundal, 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) Treated LAW Evaporation Process (TLP) System Law SBS Condensate Receipt Vessels (TLP-VSL-00009A&B) as required by the Washington Administrative Code, *Dangerous Waste Regulations*, Section WAC-173-303-640 (3)(a) through (g) applicable components."

"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 six pages numbered 1 through 6.

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
REGISTERED
PROFESSIONAL ENGINEER

EXPIRES: 02/15/06

T S Hundal
Signature

1/26/05
Date

Scope	Scope of this Integrity Assessment	The scope of this integrity assessment includes the Pretreatment Facility TLP System's two LAW SBS Condensate Receipt Vessels (TLP-VSL-00009A & TLP-VSL-00009B).
References	Material Requisition, Specifications, and Drawings.	Material Requisition: 24590-CM-MRB-MVA0-00001, Rev. 1 (including MR Supplement Nos. S0004, S0005, S0006, S0010, S0011, and S0012). Specifications: The following Specifications with their respective revision and specification change notices are listed in the above Material Requisition: 24590-WTP-3PS-MV00-T0001, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0002, Engineering Specification for Seismic Qualification Criteria for Pressure Vessels; 24590-WTP-3PS-MV00-T0003, Engineering Specification for Pressure Vessel Fatigue Analysis; 24590-WTP-3PS-G000-T0001, General Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI); 24590-WTP-3PS-G000-T0003, General Specification for Packaging, Shipping, Handling, and Storage Requirements; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks. Drawings (including drawing change notices listed in the Material Requisition referenced above): 24590-PTF-MV-TLP-00001, Rev. 0, Equipment Assembly LAW SBS Condensate Receipt Vessel TLP-VSL-00009A; 24590-PTF-MV-TLP-00002, Rev. 0, Equipment Assembly LAW SBS Condensate Receipt Vessel TLP-VSL-00009B; 24590-PTF-P1-P01T-P0001, Rev. 4, Pretreatment Facility General Arrangement Plan at El. 0'-0"; 24590-PTF-P1-P01T-P0010, Rev. 5, Pretreatment Facility General Arrangement Section D-D; 24590-PTF-P1-P01T-P0014, Rev. 7, Pretreatment Facility General Arrangement Sect. L-L and Sect. K-K; 24590-PTF-M5-V17T-P0005, Rev. 0, Process Flow Diagram Treated LAW Evaporation System (TLP).
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 ensure that the design intent fully satisfies the requirements of Washington Administrative Code, WAC-173-303-640, *Dangerous Waste Regulations* for Tank Systems.

Information Assessed		Source of Information	Discussion
Design	Vessel design standards are appropriate and adequate for the vessel's intended use.	Drawings, Material Requisition, and Specifications listed above under References; Mechanical Data Sheet, 24590-PTF-MVD-TLP-00001, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009A; Mechanical Data Sheet, 24590-PTF-MVD-TLP-00002, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009B; ASME Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.	The Material Requisition requires the use of Engineering Specification for Pressure Vessel Design and Fabrication for TLP-VSL-00009A&B vessels. This specification requires that the vessels and all appurtenances are to be designed to the ASME Section VIII, Division 1 Code rules. These rules are appropriate for an unfired pressure vessel operating with aqueous mixed waste solutions over the pressure and temperature range specified for this vessel. Additional supplementary requirements are specified in the specification for Pressure Vessel Design and Fabrication. These supplementary requirements address pressure vessel fatigue analysis, positive material identification, standard fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, quality assurance requirements, and packaging, shipping, handling and storage requirements. The Mechanical Data Sheets identify the TLP vessels as Quality Level (CM, Commercial Grade) and Seismic Category (SC-III) equipment. The above stated codes and standards are adequate and acceptable for the intended use of these Commercial Grade vessels. Each TLP-VSL-00009A&B vessel is vertical. The drawings and Mechanical Data Sheets show each vessel size as 312" ID by 328" tangent to tangent height, supported on a 65" high cylindrical skirt which in turn is supported on a ring beam to be anchored to the floor concrete slab. Top and bottom heads are flanged and dished type. The shell, heads, and skirt are to be built with a 1 in. minimum thick plate. Material for the shell, heads, and internals is to be UNS N08367 (a 6% Molybdenum stainless steel alloy), hereinafter described as 6% Mo stainless steel. Material for the support skit is specified as 304 stainless steel (maximum 0.030% Carbon), hereinafter described as 304L stainless steel. The maximum operating volume is to be about 114,000 gallons and the total internal volume is to be about 130,000 gallons.

Information Assessed		Source of Information	Discussion
Design	If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.	Specifications listed above under References; ASME Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.	The TLP system vessels TLP-VSL-00009A&B are standard vessels. The Engineering Specification for Pressure Vessel Design and Fabrication require that these vessels are to be designed and fabricated in accordance with the requirements of ASME Section VIII, Division 1 Code. The vessels are to be delivered after design, fabrication, inspection and testing with an ASME code stamp and the vessels will be registered with the National Board. These are shop fabricated vessels for mixed waste service in the PTF. The vessel design standards are appropriate and adequate for the vessels' design and fabrication.
Design	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications listed above under References; Mechanical Data Sheet, 24590-PTF-MVD-TLP-00001, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009A; Mechanical Data Sheet, 24590-PTF-MVD-TLP-00002, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009B; ASME Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; UBC, 1997, Uniform Building Code, International Conference of Building Officials.	The Engineering Specification for Pressure Vessel Design and Fabrication requires that the TLP vessels are to be designed to ASME Section VIII, Division 1 Code rules. This code requires specific consideration of the operating pressures, temperatures, seismic loads, and corrosion/erosion allowance in the design process. Supplementary design criteria are specified in the Engineering Specifications for Seismic Qualification Criteria and Structural Design Loads for Seismic Category III & IV Equipment and Tanks to provide for the seismic design analysis. The Mechanical Data Sheets identify the operating pressure and temperature ranges for each vessel, the materials selected in the corrosion report, the corrosion allowance, and the requirements for seismic qualification in the design. The Mechanical Data Sheets indicate that vessels TLP-VSL-00009A&B are to be analyzed as Seismic Category (SC-III) vessels which requires use of the seismic design requirements in the 1997 UBC. These are appropriate codes and criteria to ensure that the vessels have adequate strength at the end of their design lives.
Foundation	Vessel foundation will maintain the load of a full vessel.	Drawings and Specifications listed above under References.	The Equipment Assembly drawings show the support arrangements for TLP-VSL-00009A&B. These vessels are provided with cylindrical skirts and a ring beam to provide for bearing on concrete and anchorage. The Engineering Specification for Pressure Vessel Design and Fabrication requirements ensure adequate vessel foundation designs.

Information Assessed		Source of Information	Discussion
Foundation	If in an area subject to flooding, the vessel is anchored.	Specifications listed above under References.	Buoyant forces of an empty vessel in a flooded room are a mandatory standard design load case in the Engineering Specifications for Pressure Vessel Design and Fabrication.
Frost Heave	Vessel system will withstand the effects of frost heave.	Drawings listed above under References; 24590-PTF-3YD-TLP-00001, Rev. 0, System Description for Treated LAW Evaporation Process (TLP), including System Description Change Notice (SDCN) No. 24590-PTF-3YN-TLP-00001; 24590-WTP-DC-ST-01-001, Rev. 6, Structural Design Criteria.	The System Description and PTF general arrangement plan drawing for Elevation 0'-0" shows that vessels TLP-VSL-00009A&B are installed in the inaccessible process cells. These cells are supported by the PTF mat foundation. The Structural Design Criteria requires that all structural foundations extend into the surrounding soil below the frost line in order to preclude frost heave. The frost line is located 30 in. below finished grade. The 8-ft thick PTF mat foundation is not subject to the frost heave; therefore, the TLP system vessels will not be subject to frost heave effects.
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)	Drawings listed above under References; 24590-PTF-3YD-TLP-00001, Rev. 0, System Description for Treated LAW Evaporation Process (TLP), including System Description Change Notice (SDCN) No. 24590-PTF-3YN-TLP-00001. 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The System Description identifies that TLP-VSL-00009A & B receive primarily condensate from the LAW vitrification submerged bed scrubbers (SBSs) in the LAW primary offgas treatment system. This condensate is normally adjusted to a pH of 12 by the addition of NaOH before it is recycled through the TLP evaporator system. Waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are appropriately addressed in the Toxic Vapors and Emissions document and Prevention of Hydrogen Accumulation document. These two documents do not specifically list these vessels to exhibit any hazardous characteristics. As shown on the assembly drawing, the vessels are furnished with grounding lugs to control the discharge of static electricity and are equipped with pulse jet mixers and passive air inlet lines for hydrogen control during normal and abnormal operations and during and after design level seismic events. The vessels are equipped with internal spray rings for decontamination.

	Information Assessed	Source of Information	Discussion
Waste Characteristics	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-TLP-P0001, Rev. 1, LAW SBS Condensate Receipt Vessels TLP-VSL-00009A&B (PTF).	The Plant Item Material Selection Data Sheet shows that the material selected for TLP-VSL-00009A & B takes into account the reagents added to the waste received in the vessels.
	The waste types are compatible with each other.	24590-PTF-3YD-TLP-00001, Rev. 0, System Description for Treated LAW Evaporation Process (TLP), including System Description Change Notice (SDCN) No. 24590-PTF-3YN-TLP-00001.	The TLP System Description document identifies that the primary liquids used in vessels TLP-VSL-00009A&B are LAW SBS condensate and other dilute wastes generated in LAW operations. When received, these wastes are adjusted to pH 12 so they can be recycled through the TLP evaporator system. These wastes are compatible. No other wastes are managed in these vessels. The primary function of the TLP System vessels is to increase the concentration of Treated Low Activity Waste (LAW) feed prior to transfer to the LAW vitrification facility for glassification.
Compatibility	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)	Plant Item Material Selection Data Sheet, 24590-PTF-N1D-TLP-P0001, Rev. 1, LAW SBS Condensate Receipt Vessels TLP-VSL-00009A&B (PTF).	The Plant Item Material Selection Data Sheet shows that the material selected for TLP-VSL-00009A & B takes into account the acidic nature of the LAW SBS condensate received from the LAW facility and the reagents added to the waste received in the vessel. The material selected for the vessels is 6% Mo stainless steel. The material selected is adequate to provide the required 40 year service life for these vessels.

Information Assessed		Source of Information	Discussion
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Plant Item Material Selection Data Sheet, 24590-PTF-N1D-TLP-P0001, Rev. 1, LAW SBS Condensate Receipt Vessels TLP-VSL-00009A&B (PTF); Mechanical Data Sheet, 24590-PTF-MVD-TLP-00001, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009A; Mechanical Data Sheet, 24590-PTF-MVD-TLP-00002, Rev. 4, LAW SBS Condensate Receipt Vessel TLP-VSL-00009B.	The corrosion allowance is recommended in the Plant Item Material Selection Data Sheet. The uniform corrosion allowance of 0.040 in. for shell and heads (plus additional 0.056 in. for the bottom head to compensate for erosion due to pulse jet mixers cyclic operations) for a 40-year vessel life is adequate for 6% Mo stainless steel in this waste environment. The material selection is correctly carried forward to the vessels Mechanical Data Sheet. The materials chosen, welding processes selected, surface preparation, and pre-service inspections are appropriate for this caustic waste service. The vessel design provides internal spray wash rings to provide for periodic internal cleaning of the vessel.
Pressure Controls	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	Drawings listed above under References.	The Equipment Assembly drawings show that each TLP-VSL-00009A&B vessel is equipped with an unrestricted 8 in. diameter overflow line and Process Flow Diagram drawing shows that this line drains to Plant Wash and Disposal System vessel (PWD-VSL-00033) located at a lower level, Elevation (-) 45'-0" in the PTF as shown on the general arrangement drawings. This overflow line is much larger than any of the lines entering the vessel and therefore, has an adequate flow capacity to preclude overpressure.