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.**
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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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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 E.M. HAN (Print Name) E.M. Han (Signature) 5/5/04 (Date)

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

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24590-CM-HC4-HXYG-00138-02-00027 REV. 00A

SUBCONTRACT SUBMITTAL

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R10309384

IQRPE REVIEW
OF
THE PRETREATMENT FACILITY (PTF) ELEVATION 0'-0" SPENT RESIN COLLECTION AND DEWATERING PROCESS – SYSTEM (RDP) VESSELS RDP-VSL-00002A/B/C

"I, Fred Porter, 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) Elevation 0'-0" Spent Resin Collection And Dewatering Process – System (RDP) Vessels RDP-VSL-00002A/B/C 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 pages numbered 1 through 8.

Signature

MAY 4, 2004
Date

24590-CM-HC4-HXYG-00138-02-00027, REV. 00A

STRUCTURAL INTEGRITY ASSESSMENT OF THE PRETREATMENT FACILITY (PTF) ELEVATION 0'-0" SPENT RESIN COLLECTION AND DEWATERING PROCESS – SYSTEM (RDP) VESSELS RDP-VSL-00002A/B/C

COGEMA-IA-053

REV. 0

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 addresses Pretreatment Facility (PTF) Spent Resin Collection and Dewatering Process System (RDP) Spent Resin Slurry Vessels, RDP-VSL-00002A / B / C located at Elevation 0'-0" in Room P-0112. The primary function of these RDP system vessels is to support the continual and uninterrupted operation of the Cesium (Cs) Ion Exchange Process Systems removing spent ion exchange (IX) resin from the IX columns, verifying the resin's suitability for disposal, and transferring the resin to the Radioactive Solid Waste Handling System (RWH). The function of Spent Resin Slurry Vessels RDP-VSL- 00002A / B / C is to, provide transport liquid to remove spent resin from the Cs IX columns, provide receipt and interim storage volume for spent IX resin slurry, and provide mixing and suspension point to facilitate slurry transport and representative sampling.
References	Material Requisitions, Material Requisition Supplements, Drawings, Mechanical Data Sheets, Plant Item Material Selection Data Sheets, System Description and System Description Change Notices	Material Requisition No: 24590-QL-MRC-MVA0-A0002, Rev. 0, Pressure Vessels, High Alloy or Clad, MR Section 2 – Technical Specifications (Rev. 4, April 10, 2003); Material Requisition Supplement No: 24590-QL-MRC-MVAO-A0002-S0001 (Rev. 0, February 10, 2004); Drawing: 24590-PTF-M5-V17T-P0020, Rev. 0, Process Flow Diagram Spent Resin Collection and Dewatering Process System RDP; Drawing: 24590-PTF-P1-P01T-P0001, Rev. 3, Pretreatment Facility General Arrangement Plan at EL. 0'-0"; Drawing: 24590-PTF-P1-P01T-P0010, Rev. 4, Pretreatment Facility General Arrangement Section D-D; Drawing: 24590-PTF-P1-P01T-P0015, Rev. 6, Pretreatment Facility General Arrangement Sect. M-M & N-N; Drawing: 24590-PTF-MV-RDP-P0001, Rev. 0, Equipment Assembly Spent Resin Slurry Vessel RDP-VSL-00002A; Drawing: 24590-PTF-MV-RDP-P0002, Rev. 0, Equipment Assembly Spent Resin Slurry Vessel RDP-VSL-00002B; Drawing: 24590-PTF-MV-RDP-P0003, Rev. 0, Equipment Assembly Spent Resin Slurry Vessel RDP-VSL-00002C

References	Material Requisitions, Material Requisition Supplements, Drawings, Mechanical Data Sheets, Plant Item Material Selection Data Sheets, System Description and System Description Change Notices	Mechanical Data Sheet: Vessel, 24590-PTF-MVD-RDP-00005, Rev. 1, Spent Resin Slurry Vessel RDP-VSL-00002A, Rev.0; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-RDP-00006, Rev. 1, Spent Resin Slurry Vessel RDP-VSL-00002B, Rev.0; Mechanical Data Sheet: Vessel, 24590-PTF-MVD-RDP-00007, Rev. 1, Spent Resin Slurry Vessel RDP-VSL-00002C, Rev.0; Plant Item Material Selection Data Sheet: 24590-PTF-NID-RDP-P0001, Rev. 0, Spent Resin Slurry Vessels, RDP-VSL-00002A/B/C (PTF); System Description for Spent Resin Collection and Dewatering Process-System RDP: 24590-PTF-3YD-RDP-00001,Rev. 0; System Description Change Notice (SDCN) For System Description No. 24590-PTF-3YN-RDP-00001, Rev. 0;

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	Vessel design standards are appropriate and adequate for the vessel's intended use.	Drawings and Mechanical Data Sheets listed above under references; ASME Boiler & Pressure Vessel (B & PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 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 that the Spent Resin Slurry Vessels (RDP-VSL-00002A / B / C) and all vessel appurtenances are to be designed to ASME Section VIII, Division 1 rules. These design requirements are appropriate for unfired pressure vessels operating with aqueous 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. 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. These are adequate and acceptable codes and standards for Quality Level (QL-1), Seismic Category (SC-I) vessels. The Spent Resin Slurry Vessels are vertical vessels with 12'-0"IDs. Vessel vertical lengths are approximately 14'-0" tangent to tangent and all of the vessels are supported on cylindrical skirts. Top and bottom are ASME Code 2:1 Elliptical heads with radii equal to the tank IDs. The vessel material wall thicknesses are: shell 3/4 in., heads 0.625 in., and support skirt 1/2 in. Materials for the shells, heads and appurtenances are to be 316 (max 0.030% C; dual certified) stainless steel. Dual certified 316 stainless steel meets the chemistry requirements of specification SA 240 316L and the mechanical requirements of specification SA 240 316. This material is hereinafter referred to as SA 240 316L stainless steel. The maximum operating volume per vessel is 12,688 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.	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 that the ASME Section VIII, Division 1 vessels (RDP-VSL-00002A / B / C) be delivered after design, fabrication, inspection and testing with an ASME U stamp and that the vessels be registered with the National Board. They are shop fabricated vessels for mixed waste service in the Pretreatment Facility. As discussed in the item immediately above, the vessel design standards are appropriate and adequate for the vessels' intended uses.
	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Drawings and Mechanical Data Sheets 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-3PI-SS90-T0001, Rev. 0, Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks	The Engineering Specification for Pressure Vessel Design and Fabrication requires consideration of the operating pressures, temperatures, seismic loads, and corrosion allowance in the design process. Supplementary seismic design criteria are specified in the Engineering Specification for Seismic Qualification Criteria for Pressure Vessels to provide for the vessels seismic design analysis. The Mechanical Data Sheets identify each vessel's operating pressure and temperature ranges, the materials selected for each vessel, the corrosion allowance selected for each vessel, and the requirements for seismic design of each vessel. The Data Sheets indicate that vessels RDP-VSL-00002A / B / C are to be analyzed as Seismic Category 1 (SC-I), Quality Level 1 (QL-1), vessels which requires use of the seismic design analysis and acceptance requirements of ASME Section VIII, Division 2. Details of this analysis methodology are furnished in the Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks. The Equipment Assembly drawings specify minimum 3/4in. thickness for the vessel shells and 0.625 in. thickness for heads. These are appropriate requirements and criteria to ensure the vessels have adequate strength to withstand all loads at their end of service life.

	Information Assessed	Source of Information	Discussion
Foundation	Vessel foundation will maintain the load of a full vessel.	Drawings, Plant Item Material Selection Data Sheet and Mechanical Data Sheets listed above under References; 24590-WTP-3PS-MV00-T0001, Rev.1, Engineering Specification for Pressure Vessel Design and Fabrication	Cylindrical skirts are specified for each of the vessels with a 1/2 in. minimum thickness of SA 240 304L stainless steel as shown on the equipment assembly drawings and specified in the Plant Item Material Selection and Mechanical Data Sheets. This thickness is adequate to support the loads of full vessels. A ring beam is included at the base of each of the skirts to spread the vessel loads on the foundation rings and provide for anchor bolting. The Engineering Specification for Pressure Vessel Design and Fabrication requirements provide for adequate vessel foundation designs.
	If in an area subject to flooding, the vessel is anchored.	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 standard design load case in this specification for Pressure Vessel Design and Fabrication.
Frost Heave	Vessel system will withstand the effects of frost heave.	System Description and SDCN listed under References above; 24590-WTP-DC-ST-01-001, Rev. 2, Structural Design Criteria	The System Description identifies that vessels RDP-VSL-00002A / B / C are located in black cells in the PTF. The Structural Design Criteria requires that structural foundations extend into the surrounding soil below the frost line to preclude frost heave. The frost line is located 30" below finished grade. The PTF foundations are not subject to frost heave; therefore, the RDP vessels will not be 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, storage temperature)	Mechanical Data Sheets, Plant Item Material Selection Data Sheet, and System Description and SDCN listed above under References; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 1, Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems	The System Description states that the primary function of the RDP vessels (RDP-VSL-00002A/ B / C) is to remove and store spent IX resin from the Cesium Ion Exchange Process system while the resin suitability for disposal is tested. When disposal is approved, the resin slurry is transferred to the Radioactive Solid Waste Handling System for disposal. The System Description discusses the main functions for the RDP vessels as waste containment, offgas confinement, and hydrogen control. Normal design and operating conditions and waste characteristics (chemistry) are listed for vessels RDP-VSL- 00002A / B / C in the Mechanical Data Sheets and in the Plant Item Material Selection Data Sheet. The Toxic Vapors and Emissions from WTP Tank Systems and Miscellaneous Treatment Unit Systems document provides a summary of the Vessel equipment design features that provide for confinement and treatment of acutely or chronically toxic vapors and emissions during normal operations, abnormal operations, and during and after a design basis seismic event. Similarly, the Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems document indicates that flammable or explosive concentrations of hydrogen are a potential hazard in the RDP vessels' head spaces. During normal and abnormal operations, hydrogen control in the RDP vessels is dependent on availability of the Pulse Jet Mixers to maintain the solids in suspension to prevent potential hydrogen accumulation in resin layers inside the vessels. The Pretreatment Vessel Vent Process System provides for headspace purge during normal and abnormal operations. A backup forced purge air ventilation system provides for hydrogen control in the RDP vessels during post - design basis seismic event conditions as discussed in the Prevention of Hydrogen Accumulation document. Each vessel is furnished with a grounding lug to control the discharge of static electricity.

	Information Assessed	Source of Information	Discussion
Compatibility	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Mechanical Data Sheets, Plant Item Material Selection Data Sheet, System Description and SDCN listed above under reference.	As noted in the entry above, vessels RDP-VSL-00002A / B / C are designed to contain the waste they receive. The RDP System Description document identifies that the vessels will be used to provide mixing and suspension point to facilitate slurry transport and representative sampling. No additional chemical reagents will be added to the vessels' contents for processing during normal operations as discussed in the System Description. The Plant Item Material Selection Data Sheet provides a listing of waste chemistry for normal operations.
	The waste types are compatible with each other.	System Description and SDCN listed above under References	The primary material handled in vessels RDP-VSL-00002A / B / C is spent IX resin from the Cesium Ion Exchange Process in a slightly caustic transport fluid with a pH of about 13. All wastes handled in these vessels are of similar composition.
Corrosion	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, Plant Item Material Selection Data Sheet, System Description and SDCN listed above under References	The RDP system description identifies that vessels RDP-VSL-00002A / B / C will be located in black cells at elevation 0 feet in the PTF. They have design service lives of 40 years because there will not be access for maintenance. The Plant Item Material Selection Data Sheet for these vessels identifies the chemical characteristics of the spent IX resin from the Cesium Ion Exchange Process and the slightly caustic transport fluid. Based on these parameters, SA 240 316L stainless steel was selected as an appropriate material choice for a 40 year service life for these vessels.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Drawings, Mechanical Data Sheets, and Plant Item Material Selection Data Sheet listed above under References	The Mechanical Data Sheets and the Plant Item Material Selection Data Sheet specifies a uniform corrosion allowance of 0.040 inches for a 40 year vessel life which is adequate for SA 240 316L stainless steel in this waste environment. The materials chosen, welding processes selected, surface preparation, and preservice inspections are appropriate for this waste service.

	Information Assessed	Source of Information	Discussion
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 System Description and SDCN listed above under References	All of the RDP vessels have unrestricted overflow lines as shown on the Process Flow Diagrams that are routed to PWD-VSL-00033 which is located at a lower elevation in the PTF. The System Description of the RDP processes indicates that all overflow lines are sized to handle the largest possible flow rates into each of the vessels. Nozzle sizes on the Equipment Assembly drawings are consistent with this requirement.