

ISSUED BY
RFP-WTP POC

R11362492

CCN 208818



AFS-11-0229

April 26, 2011

Ms. Trina Howard
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Howard:

**BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00211 IQRPE
STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR ALTERATION/REWORK OF PTF
UFP ULTRA PERMEATE COLLECTION VESSELS (UFP-VSL-00062A/B) (IA-3005073-000)**

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

If you have any questions, please contact Tarlok Hundal at (509) 371-1975, or via email at tarlok.hundal@areva.com.

Sincerely,

A handwritten signature in black ink, appearing to read 'Fred R. Renz', written over a horizontal line.

Fred R. Renz
Contracts Administration
AREVA Federal Services LLC
Richland Office

Enclosure (1)

llm

cc: D. C. Pfluger, MS 5-L w/enclosure (2)

AREVA Federal Services LLC

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**IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR
ALTERATION/REWORK OF PTF UFP ULTRA PERMEATE COLLECTION VESSELS
(UFP-VSL-00062A/B)**

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.

**IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR
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(UFP-VSL-00062A/B)**

"I, Tarlok Singh 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 Alteration/Rework of PTF UFP Ultra Permeate Collection Vessels (UFP-VSL-00062A/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 fully satisfies the requirements of the WAC.

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



T. S. Hundal
Signature

4/26/11
Date

Scope	Scope of this Integrity Assessment	<p>This Integrity Assessment report is limited to address only the integrity of the stamped and installed vessels (UFP-VSL-00062A/B). The assessment will be inclusive of the planning stage-to-the-start of cutting an entry opening in each vessel's wall, during, and after finish closing it. The entry opening is required to perform the repair/rework and/or modifications of the support systems for each main vessel's internal vessels and piping due to revised loading conditions. The re-assessment of the vessels is mandated to ensure their re-compliance with the requirements of the applicable codes and standards. These vessels are located in Room P-0106 at Elevation 0'-0" of the Pretreatment Facility Building as shown on the General Arrangement Plan drawing 24590-PTF-P1-P01T-00001.</p> <p><u>Note:</u> This limited Integrity Assessment report may be made integral part of the separately prepared final Integrity Assessment report of the vessels (UFP-VSL-00062A/B).</p>
Summary of Assessment	<p>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 requirements and controls to ensure that the internal vessels and piping supports and associated alteration and/or repair work intended to be performed at the parent stamped vessels (UFP-VSL-00062A/B), i.e., it will satisfy the applicable re-stamping requirements of the Washington Administrative Code (WAC) 296-104-502 (1), which has adopted the National Board of Inspectors Code (NBIC) 2007 Part 3, as a standard guideline for the repairs and alteration of non-nuclear vessels.</p>	

References	Specifications and Mechanical Data Sheets	<p><u>Specifications:</u></p> <p>24590-WTP-3PS-MVB2-T0002, Rev. 0, Engineering Specification for Alteration and Repair of on Site Stamped ASME Code Vessels and Boilers for Subcontract (including SCN # 00010); 24590-WTP-3PS-MV00-T0001, Rev. 4, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0002, Rev. 3, Engineering Specification for Seismic Qualification of Criteria of Pressure Vessels; 24590-WTP-3PS-MV00-T0003, Rev. 3, Engineering Specification for Pressure Vessel Fatigue Analysis; 24590-WTP-3PS-MVB2-T0001, Rev. 2, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers, Heat Exchangers, and Boilers; 24590-WTP-3PS-G000-T0001, Rev. 1, General Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0010, Rev. 1, Engineering Specification for Positive Material Identification (PMI) for Construction; 24590-WTP-3PS-SS90-T0001, Rev. 2, Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks.</p> <p><u>Mechanical Data Sheets:</u></p> <p>24590-PTF-MVD-UFP-00005, Rev. 11, Mechanical Data Sheet for Ultrafilter Permeate Collection Vessel (UFP-VSL-00062A); 24590-PTF-MVD-UFP-00006, Rev. 11, Mechanical Data Sheet for Ultrafilter Permeate Collection Vessel (UFP-VSL-00062B).</p>
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References (cont'd)	Drawings	<p><u>Plant Drawing:</u></p> <p>24590-PTF-P1-P01T-00001, Rev. 7, Pretreatment Facility General Arrangement Plan at Elev. 0'-0".</p> <p><u>Vendor Fabrication Drawings (Bechtel Code 1 Drawings*):</u> * Drawings reviewed and approved for fabrication by Bechtel.</p> <p>Also see DCN # 24590-PTF-VDCN-MS-10-00007 applicable to the following drawings for (UFP-VSL-00062A): 24590-QL-POD-MVA0-00001-03-01, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel; 24590-QL-POD-MVA0-00001-03-02, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel Elevation; 24590-QL-POD-MVA0-00001-03-03, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel Plan; 24590-QL-POD-MVA0-00001-03-20, Rev. 00G, 180" ID Ultrafilter Permeate Collection Vessel Details; 24590-QL-POD-MVA0-00001-03-21, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Details; 24590-QL-POD-MVA0-00001-03-22, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (1 of 3); 24590-QL-POD-MVA0-00001-03-23, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (2 of 3); 24590-QL-POD-MVA0-00001-03-24, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (3 of 3); 24590-QL-POD-MVA0-00001-03-40, Rev. 00B, 180" ID Ultrafilter Permeate Collection Vessel Internal Support; 24590-QL-POD-MVA0-00001-03-41, Rev. 00B, 180" ID Ultrafilter Permeate Collection Vessel Internal Support.</p> <p>Also see DCN # 24590-PTF-VDCN-MS-10-00008 applicable to the following drawings for (UFP-VSL-00062B): 24590-QL-POD-MVA0-00001-03-04, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel; 24590-QL-POD-MVA0-00001-03-05, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel Elevation; 24590-QL-POD-MVA0-00001-03-06, Rev. 00F, 180" ID Ultrafilter Permeate Collection Vessel Plan; 24590-QL-POD-MVA0-00001-03-30, Rev. 00G, 180" ID Ultrafilter Permeate Collection Vessel Details; 24590-QL-POD-MVA0-00001-03-31, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Details; 24590-QL-POD-MVA0-00001-03-32, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (1 of 3); 24590-QL-POD-MVA0-00001-03-33, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (2 of 3); 24590-QL-POD-MVA0-00001-03-34, Rev. 00E, 180" ID Ultrafilter Permeate Collection Vessel Nozzle Details (3 of 3); 24590-QL-POD-MVA0-00001-03-42, Rev. 00B, 180" ID Ultrafilter Permeate Collection Vessel Internal Support; 24590-QL-POD-MVA0-00001-03-43, Rev. 00B, 180" ID Ultrafilter Permeate Collection Vessel Internal Support.</p>
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Information Assessed	Source of Information	Assessment
<p style="text-align: center;">Design</p> <p>The design standards are appropriate and adequate for the alteration and repair work of the existing stamped vessel.</p>	<p>Drawings, Mechanical Data Sheets, and Specifications listed above under References;</p> <p>ASME Boiler & Pressure Vessel Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels;</p> <p>NBIC 2007, Part 3 with addenda, National Board Inspection Code, National Board of Boiler and Pressure Vessel Inspectors;</p> <p>WAC 296-104-502(1), Washington Administrative Code.</p>	<p>The original Mechanical Data Sheets (MDSs) required that the PTF vessels (UFP-VSL-00062A/B) be designed and fabricated per ASME Code, Section VIII, Div. 1 and be stamped and registered per National Boards of Registration requirements. The stamped vessels are installed in Room P-0106 at Elevation 0'-0" as shown on the PTF General Arrangement Plan drawing. However, subsequent to the installation of each vessel, its MDS was revised with new loading conditions such as seismic and thermal. The Specification for Alteration and Repair of Stamped Vessels requires that the alterations and repairs shall be done in accordance with the requirements of ASME Section VIII, Div. 1 Code, NBIC 2007 Part 3 Code, and WAC 296-104-502(1). It further states that the altered/repared vessel shall be re-stamped (R-stamped) and re-registered with the National Board of Registration. The requirements of the referenced engineering specifications are inclusive of the design of altered vessel. The requirements include structural design, positive material identification, fabrication tolerances, acceptable welding procedures, welder qualifications and testing records, and NDE inspections. Each vessel is identified as Quality Level (Q) and Seismic Category (SC-I) in the MDS and drawings. The requirements listed in the aforementioned codes, documents, and standards identified in Specification for Alteration and Repair, are adequate and acceptable for the repair work of the vessel's internal vessels supports and piping supports and associated components.</p>

Information Assessed	Source of Information	Assessment
<p style="text-align: center;">Design (cont'd)</p> <p>Vessel repair work of modifying the internals will not compromise vessel's integrity and the design calculations for the altered vessel demonstrate that sound engineering principles of construction are used</p>	<p>Drawings, Mechanical Data Sheets, and Specifications listed above under References;</p> <p>ASME Boiler & Pressure Vessel Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 24590-PTF-MVC-UFP-00023, Rev. B, UFP-VSL-00062A/B/C, Ultra Permeate Collection Vessel Stress Analysis with ANSYS (BNI Design Calculation); 24590-PTF-RPT-MS-10-002, Rev. 0, Buckling Evaluation for Vessels Onsite that Need a Construction Access Through the Vessel Shell; 24590-QL-POD-MVA0-00001-09-07, Rev. 00B, Vessel Code Calculations (Vendor Code Calculations); NBIC 2007, Part 3 with addenda, National Board Inspection Code, National Board of Boiler and Pressure Vessel Inspectors; WAC 296-104-502(1), Washington Administrative Code.</p>	<p>The PTF Vessels (UFP-VSL-00062A/B) are standard stamped and registered ASME Code Section VIII, Div. 1 vessels. These stamped, registered, and installed vessels comply with the requirements stated in the original MDSs. However, the MDSs have been revised after the installation of the vessels. The revised current MDSs show new design loading conditions such as seismic and thermal. Subsequent to the issuance of revised loading conditions, BNI performed Design Calculation of the vessels as a supplement to the Vendor Code Calculations. The BNI Design Calculation determined initially that the original vessels configuration do not sustain the new loading conditions of the revised MDSs. Series of design modifications were performed on the original design which required the redesign of internal components supports system namely the Pulse Jet Mixers (PJM) and Charge Vessel supports and piping and pipe supports as detailed and shown in Attachments H and I of the BNI Design Calculation document. Each vessel shell wall entry opening of 8 ft x 8 ft size required to perform modifications of support system of the internals was evaluated. The Buckling Evaluation document determined that the structural stresses of the parent vessels with the above mentioned opening for repair work will be well within the allowable limits, therefore, its structural integrity will not be compromised. The Specification for Alteration and Repair of the vessels identifies that all repair work on the stamped vessels will be done in accordance with the requirements of ASME Section VIII, Div. 1, NBIC 2007 Code Part 3, and WAC 296-104-502(1). Review of the drawings and the BNI Design Calculation demonstrate that sound engineering principles of design/construction have been used in the design media. It should be noted that the final evaluation of each parent vessel and its components is not in the scope of this report; however, it will be addressed in their final integrity report.</p>

Information Assessed	Source of Information	Assessment
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Design (cont'd)</p> <p>Modified internal supports (material, welding details, design configuration) will not compromise vessel's integrity, i.e., the altered vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure and temperature, and seismic loads</p>	<p>Drawings, Mechanical Data Sheets, and Specifications listed above under References;</p> <p>ASME Boiler & Pressure Vessel Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels;</p> <p>24590-PTF-S0C-S15T-00057, Rev. A, Seismic Analysis of Pretreatment Building-WSGM In-Structure Response Spectra;</p> <p>24590-WTP-MVC-50-00001, Rev. A, Pulse Jet Mixer Overblow Vessel Loads, including ECCN 24590-WTP-MVE-50-00009);</p> <p>24590-PTF-MVC-UFP-00023, Rev. B, UFP-VSL-00062A/B/C, Ultra Permeate Collection Vessel Stress Analysis with ANSYS (BNI Design Calculation);</p> <p>24590-QL-POD-MVA0-00001-09-07, Rev. 00B, Vessel Code Calculations (Vendor Code Calculations);</p> <p>NBIC 2007, Part 3 with addenda, National Board Inspection Code, National Board of Boiler and Pressure Vessel Inspectors;</p> <p>WAC 296-104-502(1), Washington Administrative Code.</p>	<p>The MDS and the Specification for Alteration and Repair of Stamped ASME Vessels identify each vessel's new loading conditions and applicable codes for its re-qualification. Detailed requirements for seismic design of the vessels are furnished in the Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks. After the installation of the vessels the design loading such as seismic and temperature conditions have been revised per MDSs which necessitated the review of the Vendor Code Calculations for design verification purposes. The BNI Design Calculation was performed using revised seismic forces per Seismic Analysis of PTF document, new thermal conditions, and PJM load per Pulse Jet Mixer Overblow Vessels Loads document, as a supplement to the Vendor Code Calculations. The BNI Design Calculation initially showed that the stamped vessels (UFP-VSL-00062A/B) could not sustain the revised loading conditions stated above. Therefore, in order to qualify each vessel for revised loading conditions including the specified corrosion allowance in the MDS document, the BNI Design Calculation recommended modification of the internals including internal vessels' supports and piping supports and piping system to have adequate strength for the specified design life of 40 years. The Engineering Specification for Alteration and Repair of Stamped ASME Vessel requires that any alterations made to the vessel and its internals shall comply with the requirements of ASME Section VIII, Div.1, NBIC 2007 Code Part 3, and WAC 296-104-502(1). Therefore, the rework/repair modifications performed in compliance to the above listed codes and standards will ensure structural integrity of each parent vessel and its components.</p>

Information Assessed	Source of Information	Assessment
<p>Design (cont'd) Modified internal supports (material, welding details, and design configuration) will not compromise integrity of pulse jet mixers and charge vessels.</p>	<p>Drawings, Mechanical Data Sheets, and Specifications listed above under References; 24590-WTP-DC-ST-04-001, Rev. 3A, Seismic Analysis and Design Criteria; ASME Boiler & Pressure Vessel Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 24590-PTF-SOC-S15T-00057, Rev. A, Seismic Analysis of Pretreatment Building-WSGM In-Structure Response Spectra; 24590-WTP-MVC-50-00001, Rev. A, Pulse Jet Mixer Overblow Vessel Loads, including ECCN 24590-WTP-MVE-50-00009); 24590-PTF-MVC-UFP-00023, Rev. B, UFP-VSL-00062A/B/C, Ultra Permeate Collection Vessel Stress Analysis with ANSYS (BNI Design Calculation); NBIC 2007 Code, Part 3 with addenda, National Board Inspection Code, National Board of Boiler and Pressure Vessel Inspectors; WAC 296-104-502(1), Washington Administrative Code.</p>	<p>The MDS for each vessel identifies its operating pressure and temperature ranges, the materials selected for the vessel and its internals, the corrosion allowance, the quality level, and the seismic design requirements. The ASME Code, Section VIII, Div. 1 Code, requires that corrosion allowance material be considered when evaluating the adequacy of vessel components for these loads at end of its life. Detailed requirements for seismic design of the vessels are furnished in the Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks. The vendor drawings show that each vertical parent vessel houses 12 internal vessels; six pulse jet mixers and six charge vessels, all built with using 316 stainless steel plates (max. 0.03% C dual certified). These internal vessels are supported off from the parent vessel and some of them from an adjoining internal vessel. The Engineering Specification for Alteration and Repair of Stamped ASME vessel requires that any alterations made to each vessel and its internals shall comply with the requirements of ASME Section VIII, Div. 1, NBIC 2007 Code Part 3, and WAC 296-104-502(1). The BNI Design Calculation reviewed shows that the modified vessel will withstand the loading conditions identified in MDS, Seismic Analysis of PTF, and Pulse Jet Mixer Overblow Vessel Loads documents. Therefore, the structural integrity of each vessel and its internals will not be compromised.</p>

Information Assessed	Source of Information	Assessment
<p style="text-align: center;">Foundation</p> <p>The vessel support and foundation of the altered/modified vessel will sustain modified full vessel load.</p>	<p>Mechanical Data Sheets and Specifications listed above under References;</p> <p>24590-WTP-DC-ST-04-001, Rev. 3A, Seismic Analysis and Design Criteria; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria; 24590-PTF-MVC-UFP-00023, Rev. B, UFP-VSL-00062A/B/C, Ultra Permeate Collection Vessel Stress Analysis with ANSYS (BNI Design Calculation).</p>	<p>The MDS for vessels (UFP-VSL-00062A/B) requires that each vessel's support system is to be designed in accordance with the applicable provisions specified in Seismic Analysis and Design Criteria and Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks. The requirements of the above listed two documents require the use of Structural Design Criteria. The BNI Design Calculation reviewed show that vessels' support skirt resting on a base plate is adequately designed to sustain the applicable loads of the modified vessel. The support skirt base plate in turn is anchored to floor with welds to the plates embedded in the concrete slab. The slab is supposed to sustain full load of the vessels, however, their assessment is not in the scope of this integrity assessment. It will be covered under a separate report.</p>