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RPP-WTP PDC

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AFS-11-0232



April 27, 2011

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

RPP-WTP
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BY PDC

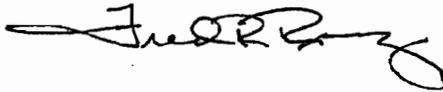
Dear Ms. Howard:

**BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00211 IQRPE
STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR PTF PJV MISCELLANEOUS
UNITS (DEMISTERS) PJV-DMST-00002A/B/C (IA-3005077-000)**

The integrity assessment of the subject units 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 units 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,



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 PTF PJV
MISCELLANEOUS UNITS (DEMISTERS)
PJV-DMST-00002A/B/C**

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 PTF PJV
MISCELLANEOUS UNITS (DEMISTERS)
PJV-DMST-00002A/B/C**

"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 PTF PJV Miscellaneous Units (Demisters) PJV-DMST-00002A/B/C, 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 ten (10) pages numbered one (1) through ten (10).



T. Hundal
Signature

4/27/11
Date

Scope	Scope of this Integrity Assessment	This Integrity Assessment addresses three Miscellaneous Units (MUs), the Demisters (PJV-DMST-00002A/B/C) considered as vessels are components of the PTF Pulse Jet Ventilation System (PJV). These MUs are located in PT Filter Cave (Room P- 0335) at Elevation 56'-0" of the Pretreatment Facility Building as shown on the General Arrangement Plan drawing 24590-PTF-P1-P01T-00003.
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 requirements and controls to ensure that the design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, <i>Dangerous Waste Regulations</i> , WAC-173-303-640, <i>Tank Systems</i> .

References	<p><u>Material Requisition (MR):</u> 24590-QL-MRA-MVA0-00013, Rev. 2, PJV Demisters (N215), including Supplement # S0001 thru # S0004 and TCN # T0001 thru T0004 to Rev. 2.</p> <p><u>Specifications:</u> Following Specifications including their revision and specification change notices (SCNs) are listed in the MR document listed above:</p> <p>24590-WTP-3PS-MV00-T0001, Engineering Specification for Pressure Vessel Design and Fabrication; 24590-WTP-3PS-MV00-T0002, Engineering Specification for Seismic Qualification of Criteria of Pressure Vessels; 24590-WTP-3PS-MV00-T0003, Engineering Specification for Pressure Vessel Fatigue Analysis; 24590-WTP-3PS-MVB2-T0001, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers, Heat Exchangers, and Boilers; 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, Handling, and Storage Requirements; 24590-WTP-3PS-SS90-T0001, Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks.</p> <p><u>Plant Drawings:</u></p> <p>24590-PTF-P1-P01T-00003, Rev. 4, Pretreatment Facility General Arrangement Plan at Elev. 56'-0"; 24590-PTF-M6-PJV-00002, Rev. 3, P&ID-PTF Pulse Jet Ventilation System Inlet Header to Demister Outlet; 24590-PTF-M5-V17T-00021002, Rev. 2, Process Flow Diagram Pretreatment RFD/PJM Exhaust (PJV) Systems PVP/PVV/PJV; 24590-PTF-DB-S13T-00059, Rev. 1, Pretreatment Facility Structural, Concrete Forming, Embed Layout Details El. 56'-0" Sh 6; 24590-PTF-DB-S13T-00252, Rev. 2, Pretreatment Facility Structural Concrete Forming Partial Plan El. 56'-0" Sh 7; 24590-PTF-DB-S13T-00070, Rev. 0, Pretreatment Facility Structural, El.56'-0" Liners Filter Cave Area; 24590-PTF-DD-S13T-00072, Rev. 0, Pretreatment Facility Structural, El.56'-0" Liners Sections and Details; 24590-PTF-DD-S13T-00221, Rev. 0, Pretreatment Facility Structural Concrete Embedments El. 56'-0" Vessels Sh 1.</p>
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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">References (cont'd)</p> <p>Vendor Drawings, Mechanical Data Sheet, and System Description</p>	<p><u>Vendor Fabrication Drawings (Bechtel Code 1 and 2 Drawings*):</u></p> <p>24590-QL-POB-MVA0-00013-04-00001, Rev. 00G, PTF Demister Vessel General Notes; 24590-QL-POB-MVA0-00013-04-00002, Rev. 00D, PTF Demister Vessel Nozzle Details; 24590-QL-POB-MVA0-00013-04-00003, Rev. 00F, PTF Demister Vessel Partial Sections & Skirt Details; 24590-QL-POB-MVA0-00013-04-00004, Rev. 00F, PTF Demister Vessel Outline/Assembly Drawing; 24590-QL-POB-MVA0-00013-04-00006, Rev. 00F, PTF Demister Vessel, 3-PC Sitting Mist Eliminator Element.</p> <p>* Code 1 Drawing: BNI reviewed and approved the drawing for fabrication. Code 2 Drawing: BNI reviewed the drawing with comments and approved it with conditional acceptance for fabrication (Final acceptance and approval of fabrication is subject to resolution of the comments).</p> <p><u>Mechanical Data Sheet:</u></p> <p>24590-PTF-MVD-PJV-00004, Rev. 0, PJV Demisters (PJV-DMST-00002A/B/C), including SDDR # 24590-WTP-SDDR-MS-09-00113).</p> <p><u>System Description:</u></p> <p>24590-PTF-3YD-PJV-00001, Rev. 0, Systems Description for PTF Pulse Jet Ventilation System (PJV), including SDCN # 24590-PTF-3YN-PJV-00004.</p>
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	Information Assessed	Source of Information	Assessment
Design	<p>Vessel design standards are appropriate and adequate for the vessel's intended use.</p>	<p>Drawings, Specifications, and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler & Pressure Vessel (B&PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels.</p>	<p>The PTF Demisters (PJV-DMST-00002A/B/C) are components in the PTF PJV system. These Demisters or MUs are located in Room P-0355, at Elevation 56'-0" as shown on the PTF General Arrangement Plan drawing. They are accessible for maintenance by remote control. The Mechanical Data Sheet (MDS) requires that these vessels be designed, fabricated, and tested in accordance with the requirements of ASME B&PV Code, Section VIII, Div. 1. The MDS also requires that the Demisters shall be code stamped and registered with the National Board of Registration. Supplementary requirements are specified in the referenced engineering specifications. The supplementary requirements include structural design, positive material identification, fabrication tolerances, acceptable welding procedures, welder qualifications and testing records, NDE inspections and records, and packaging, handling, and storage requirements for the Demister assemblies. The Demister vessels are identified as Quality Level (Q) and Seismic Category (SC-I) in the Mechanical Data Sheet and drawings. The requirements listed in the aforementioned codes, data sheet, and documents and standards identified in specifications, are adequate and acceptable design codes and standards for the intended use of the Demisters.</p>

	Information Assessed	Source of Information	Assessment
Design (cont'd)	<p>If a non-standard vessel is to be used, the design calculations demonstrate sound engineering principles of construction.</p>	<p>Drawings and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler & Pressure Vessel (B&PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 24590-QL-POB-MVA0-00013-01-00001, Rev. 00B, ASME Code Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-01-00002, Rev. 00B, Nozzle Load Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation).</p>	<p>The PTF Demisters (PJV-DMST-00002A/B/C) are standard ASME B&PV Code Section VIII, Div. 1 assemblies to be delivered after design, fabrication, inspection, and testing to specific design parameters listed in the Mechanical Data Sheet. Review of the vendor drawings and Vendor Calculations demonstrates that sound engineering principles of design/construction have been used.</p>

	Information Assessed	Source of Information	Assessment
Design (cont'd)	<p>Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.</p>	<p>Mechanical Systems Data Sheet, Specifications, and Drawings listed above under References;</p> <p>ASME Boiler & Pressure Vessel (B&PV) Code, Section VIII, Div. 1, Rules for Construction of Pressure Vessels; 24590-QL-POB-MVA0-00013-01-00001, Rev. 00B, ASME Code Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-01-00002, Rev. 00B, Nozzle Load Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation); 24590-PTF-DDC-S13T-00029, Rev. B, Embed Design for PVP-HEME-00001A/B/C, PJV-DMST-00002/A/B/C and DIW-VSL-00002/3 at El. 56' in the PTF Building (Design Calculation); 24590-PTF-N1D-PJV-00003, Rev. 0, Corrosion Evaluation (PJV-DMST-00002A/B/C) PTF PJV Demister.</p>	<p>The Mechanical Data Sheet identifies the Demisters 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 B&PV Code, Section VIII, Div. 1, requires that corrosion allowance material be considered when evaluating the adequacy of vessel components for these loads at the end of its life. Detailed requirements for seismic design of the columns are furnished in the Engineering Specification for Seismic Qualification of Seismic Category I/II Equipment and Tanks. The vendor drawings show that each Demister vessel is 96" ID x 150" height, between tangent lines with top and bottom ASME F&D Heads. Each vessel is built with 3/4" thick shell and 1/2" thick heads, all using 304L stainless steel plates (max. 0.03% C dual certified) hereinafter known as 304L material. The Corrosion Evaluation document recommended the 304L material with adequate corrosion allowance. The Vendor and Design Calculations reviewed show that the Demisters will withstand operating pressure, temperature, corrosion allowance, and seismic loads for the specified design life of 40 years.</p>

Information Assessed	Source of Information	Assessment
<p style="text-align: center;">Foundation</p> <p>Vessel foundation will maintain the load of a full vessel.</p>	<p>Mechanical Data Sheet 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-QL-POB-MVA0-00013-01-00001, Rev. 00B, ASME Code Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation); 24590-PTF-DDC-S13T-00029, Rev. B, Embed Design for PVP-HEME-00001A/B/C, PJV-DMST-00002/A/B/C and DIW-VSL-00002/3 at El. 56' in the PTF Building (Design Calculation).</p>	<p>The Mechanical Data Sheet for Demisters requires that these vessels' support frames are 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 Vendor and Design Calculations reviewed show that each Demister support skirt resting on a base plate is adequately designed to sustain the applicable loads. The base plate doughnut disc in turn is anchored to the floor with anchor bolts welded to the steel plates embedded in concrete slab. The slab is supposed to sustain the full load of the Demisters, however, its assessment is not in the scope of this integrity assessment. It will be covered under a separate report.</p>
<p>If in an area subject to flooding, the vessel is anchored.</p>	<p>Mechanical Data Sheet, Specifications, and Drawings listed above under References;</p> <p>24590-PTF-PER-M-04-001, Rev. 0, Flooding Volume for the PTF Facility; 24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation); 24590-PTF-DDC-S13T-00029, Rev. B, Embed Design for PVP-HEME-00001A/B/C, PJV-DMST-00002/A/B/C and DIW-VSL-00002/3 at El. 56' in the PTF Building (Design Calculation).</p>	<p>The PTF Demisters are part of the PJV system. This PJV system is a combined system. It is comprised of the process treatment for removal of condensate and mist from the RFD/PJM exhausts followed by the HVAC exhaust equipment consisting of filters and fans. Demisters are commonly used to remove fine aerosols and mist. Design for flooding is not a required load case in the Flooding Volume document or in Mechanical Data Sheet. However, the Vendor Calculation, Design Calculation, and drawings reviewed show that the Demisters are anchored to the floor concrete slab providing adequate seismic resistance.</p>

Information Assessed		Source of Information	Assessment
Foundation (cont'd)	Vessel system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12D, Structural Design Criteria.	The Structural Design Criteria 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. The frost line is 30 in. below grade. The plant drawings show that the Demisters are located at above grade floor Elevation 56'-0" inside the PTF Building, therefore, they are not subject to the 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)	Mechanical Data Sheet and System Description listed above under References; 24590-PTF-NID-PJV-00003, Rev. 0. Corrosion Evaluation, PTF PJV Demisters (PJV-DMST-00002A/B/C); 24590-WTP-PER-PR-03-002, Rev. 3, Control of Toxic Vapors and Emissions from WTP Tank and Miscellaneous Unit Systems; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems.	The Mechanical Data Sheet presents the PJV system's specific gravity, operating temperatures and pressures. The Corrosion Evaluation report addresses the chemical composition of the exhaust gases and the routine and non-routine operations and potential temperatures range to select appropriate Demister materials and specify the corrosion allowance. The main safety function of the Demisters is to provide mechanism to mitigate radioactive release to environment. The mitigation and control of the waste's hazards are appropriately addressed in the Prevention of Hydrogen Accumulation document and Control of Toxic Vapors and Emissions document. These two documents do not specifically list the PTF Demisters to exhibit any dangerous waste characteristics such as reactive or ignitable. The System Description document and Control of Toxic Vapors and Emissions document describe that the Demisters are designed to remove fine aerosols and mist from the exhaust gases to ensure reduced loading of HEPA filters downstream from them. The Demister design is required to provide an intact housing pressure boundary during normal operations and during and after earthquake loads.

Information Assessed		Source of Information	Assessment
Waste Characteristics (cont'd)	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	System Description listed above under References; 24590-PTF-N1D-PJV-00003, Rev. 0. Corrosion Evaluation, PTF PJV Demisters (PJV-DMST-00002A/B/C).	The Corrosion Evaluation document demonstrates that the Demisters are designed to process the exhaust gases as discussed above. The System Description document discusses normal and abnormal operations for the Demisters (PJV-DMST-00002A/B/C). Reagents will not normally be added to the Demisters during normal operations.
	The waste types are compatible with each other.	System Description listed above under References.	The System Description document for the PTF PJV System does not describe any operations where incompatible wastes are mixed in these Demisters.
Corrosion	Vessel material and protective coatings ensure the vessel structure is adequately protected from the corrosive effects of the waste stream and external environments (expected to not leak or fail for the design life of the system)	24590-PTF-N1D-PJV-00003, Rev. 0. Corrosion Evaluation, PTF PJV Demisters (PJV-DMST-00002A/B/C); 24590-QL-POB-MVA0-00013-01-00001, Rev. 00B, ASME Code Calculations for PJV Demister Vessels (Vendor Calculation); 24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation).	The Corrosion Evaluation report selection of 304L material provides adequate resistance to pitting corrosion, stress corrosion cracking, and crevice corrosion. This report identifies 0.04 in. corrosion allowance for the Demisters. The Vendor Calculations reviewed show that the corrosion allowance has been appropriately accounted for in the design process and the corrosion allowance provided is adequate for the 40-year life of the Demisters.

	Information Assessed	Source of Information	Assessment
Corrosion (cont'd)	Corrosion allowance is adequate for the intended service life of the vessel.	<p>Mechanical Data Sheet and Drawings listed above under references;</p> <p>24590-PTF-N1D-PJV-00003, Rev. 0. Corrosion Evaluation, PTF PJV Demisters (PJV-DMST-00002A/B/C);</p> <p>24590-QL-POB-MVA0-00013-01-00001, Rev. 00B, ASME Code Calculations for PJV Demister Vessels (Vendor Calculation);</p> <p>24590-QL-POB-MVA0-00013-01-00002, Rev. 00B, Nozzle Load Calculations for PJV Demister Vessels (Vendor Calculation);</p> <p>24590-QL-POB-MVA0-00013-10-00001, Rev. 00D, Seismic Qualification of PJV Demister Vessels (Vendor Calculation).</p>	<p>The basis for the Demisters material selection is provided in the Corrosion Evaluation report. Minimum corrosion allowance is appropriately listed in the Mechanical Data Sheet. The Vendor Calculations and drawings reviewed show that the plate thickness of each vessel is adequate for its intended service life of 40 years.</p>
Pressure Relief	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessel are exceeded.	<p>System Description and Mechanical Data Sheet listed above under References;</p> <p>24590-PTF-N1D-PJV-00003, Rev. 0. Corrosion Evaluation, PTF PJV Demisters (PJV-DMST-00002A/B/C).</p>	<p>The System Description provides a discussion of the normal operating conditions for the PTF Pulse Jet Ventilation (PJV) system. The Mechanical Data Sheet for the Demisters lists the maximum operating internal and external pressure of 0 psi and 1.3 psi, respectively, however, the Demisters are designed for 15 psi internal pressure and full vacuum external pressure conditions. The Demisters are designed for pressures which are much higher than the normal operation conditions, therefore, they will handle any significant pressure fluctuation in the exhaust gas system. Each Demister is also provided with a vent which will prevent pressure buildup in the vessel.</p>