ISSUED BY
RPP-WTP PDC

R11578874

24590-CM-HC4-HXYG-00240-02-00008

REV 00A

SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED

AFS-13-0042

March 4, 2013

Mr. Gary Ellers
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Mr. Ellers:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240 IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW LVP HEPA FILTER HOUSINGS (LVP-HEPA-00001A/2A/3A AND -00001B/2B (IA-3006866-001)

The integrity assessment of the subject HEPA Filter Housings 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 HEPA Filter Housings 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,

Elizabeth W. Smith, C.P.M
Subcontract Administrator
AREVA Federal Services LLC
Richland Office

Enclosure (1)

LK

cc: D. C. Pfluger, MS5-I w/enclosure (2)

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAW LVP HEPA FILTER HOUSINGS (LVP-HEPA-00001A/2A/3A and -00001B/2B)

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
LAW LVP HEPA FILTER HOUSINGS
(LVP-HEPA-00001A/2A/3A and -00001B/2B)

"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 LAW LVP HEPA Filter Housings, 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 nine (9) pages numbered one (1) through nine (9).

T S Hundal
Signature

3/4/13
Date

Scope	Scope of this Integrity Assessment	The scope of this integrity assessment includes five HEPA Filter Housings (LVP-HEPA-00001A/2A/3A, -00001B/2B), also known as Miscellaneous Units (MUs) or Plant Items associated with the LVP system as shown on P&ID Drawing 24590-LAW-M6-LVP-00001003. The HEPA Filters provide the final removal of radioactive particulates to protect downstream equipment from contamination from the combined primary offgas and vessel vent streams. These HEPA Filter Housings are mounted on the concrete pads of floor slab in Room L-0304H at Elevation 48'-0" of the LAW facility as shown on General Arrangement Plan Drawing 24590-LAW-P1-P01T- 00005. **NOTE: This report supersedes the previous issued following integrity assessment report: 24590-CM-HC4-HXYG-00240-01-00007, Rev. 00A (AREVA Federal Services LLC report #: IA-3006866-000).**
	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, *Dangerous Waste Regulations,* Section WAC-173-303-640 (3) (a) through (g) applicable elements of the *Tank Systems.*

References	Material Requisition, Specifications, and Plant Drawings	Material Requisition (MR): 24590-QL-MRA-MKH0-00001, Rev. 7, Safe Change HEPA Housing (Q). Specifications: The following Specifications with their respective revision and Specification Change Notices (SCNs) are listed in the above listed MR: 24590-WTP-3PS-MKH0-T0001, Engineering Specification for Safe Change HEPA Filter Housing; 24590-WTP-3PS-MKH0-T0002, Engineering Specification for Nuclear Grade High Efficiency Particulate Air (HEPA) Filters (ASME AG-1 Section FK Filters); 24590-WTP-3PS-MKH0-T0003, Engineering Specification for Remote Change HEPA Filter Housings; 24590-WTP-3PS-MKH0-T0007, Engineering Specification for Axial Flow HEPA Filter Housings; 24590-WTP-3PS-MDH0-T0001, Engineering Specification for Heating, Ventilating, and Air Conditioning System Seismic Category III and IV Ductwork (Q); 24590-WTP-3PS-G000-T0001, Engineering Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication; 24590-WTP-3PS-G000-T0003, Engineering Specification for Packaging, Handling, and Storage Requirements; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III & IV Equipment and Tanks. Plant Drawings: 24590-LAW-P1-P01T-00005, Rev. 4, LAW Vitrification Building General Arrangement Plan at El. 48'-0"; 24590-LAW-P1-P23T-00052, Rev. 3, LAW Vitrification Building Equipment Location Plan El. 48'-0"/Area 5; 24590-WTP-D0-S13T-00003, Rev. 3, Civil/Structural Standards-Abbreviations and Legend; 24590-WTP-DB-S13T-00007, Rev. 1, Civil/Structural Standards-Standard Concrete Equipment Pads; 24590-WTP-DB-S13T-00008, Rev. 0 , Civil/Structural Standards-Standard Concrete Equipment Pads; 24590-LAW-DD-S13T-00308, Rev. 2, LAW Vitrification Main Building LVP-HEPA Equipment Anchorage at El. (+) 48'-0"; 24590-LAW-M6-LVP-00001003, Rev. 0, P&ID- LAW Secondary Offgas/Vessel Vent Process System HEPA Filters; 24590-LAW-M5-V17T-00010, Rev. 4, Process Flow Diagram LAW Vitrification Ammonia & Secondary Offgas (System AMR & LVP), including DCNs # 24590-LAW-M5N-V17T-00012 and 24590-LAW-M5N-V17T-00015.

References (cont'd)	Vendor Drawings, Mechanical Data Sheet, and System Description	Vendor Fabrication Drawings (*Bechtel Status Code 1, 2, or 4 Drawings): 24590-QL-POA-MKH0-00001-04-00068, Rev. 00G, MKD LVP Exhaust RPF-2H2W-K-316L-TITO; 24590-QL-POA-MKH0-00001-04-00069, Rev. 00E, MKD LVP Exhaust RPF-2H2W-K-316L-TITO Specifications; 24590-QL-POA-MKH0-00001-04-00136, Rev. 00D, Gaskets for RPF Transition, Test, Duct and Filter Housing for -115" W.G. Systems; 24590-QL-POA-MKH0-00001-04-00137, Rev. 00D, RPF Downstream Sample Test Duct (316L SST) for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00139, Rev. 00E, RPF-2H2W-K-316L-TITO Base /Drain Details; 24590-QL-POA-MKH0-00001-04-00141, Rev. 00E, RPF-2H2W-K-316L Housing Assembly for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00144, Rev. 00C, RPF-2H2W-K-316L Housing Parts Details for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00145, Rev. 00D, RPF-2H2W-K-316L Housing Parts Details for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00146, Rev. 00C, RPF-2H2W-K-316L Housing Parts Details for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00147, Rev. 00B, RPF-2H2W-K-316L Housing Parts Details for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00148, Rev. 00D, RPF-2H2W-K-316L Housing Lifting and Assembly for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00149, Rev. 00F, RPF-2H2W-K-316L-TITO Overall Transition Assembly for -115" W.G.; 24590-QL-POA-MKH0-00001-04-00150, Rev. 00D, RPF-2H2W-K-316L-TITO Transition Assembly; 24590-QL-POA-MKH0-00001-04-00155, Rev. 00E, RPF Square Elbow W/Square to 18" Round Transition and Flange (316L SST) for -115" W.G.; * Bechtel Status Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel. Bechtel Status Code 2 Drawing is an "as fabricated vendor drawing" approved (with comments)/accepted by Bechtel. Bechtel Status Code 4 Drawing is an "as fabricated vendor drawing" approved without review by Bechtel. Mechanical Data Sheet (MDS), Vendor Document: 24590-QL-POA-MKH0-00001-01-00039, Rev. 00D, Safe Change HEPA Filter Housing (LVP-HEPA-00001A/2A/3A, -00001B/2B), (including SDDR-HV-09-00014 & SDDR-HV-10-00001). (Vendor Version: 24590-LAW-MKD-LVP-00013.) System Description: 24590-LAW-3YD-LOP-00001, Rev. 3, System Description for the LAW Primary Offgas (LOP) and Secondary Offgas/Vessel Vent (LVP) Systems (including SDCN # 24590-LAW-3YN-LOP-00011, -00012, and -00013).

Information Assessed		Source of Information	Assessment
Design	Plant Item design standards are appropriate and adequate for the vessel's intended use.	Specifications, Drawings, and Mechanical Data Sheet listed above under References; ASME AG-1, Code on Nuclear Air and Gas Treatment, American Society of Mechanical Engineers (1997 Edition with ASME AG-1a-2000 Addenda); ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers.	The LAW HEPA Filters Housings (LVP-HEPA-00001A/2A/3A and -00001B/2B) are considered as vessels. They are also interchangeably termed herein as MUs or Plant Items. The Engineering Specification for Safe Change HEPA Filter Housing and Mechanical Data Sheet require that the design and fabrication be per ASME AG-1 and ASME B&PV Code, Section IX. Supplemental detailed requirements for the HEPA Filters Housings fabrication are specified in various engineering specifications listed in the References section herein. These requirements include items such as, positive material identification, fabrication tolerances, welding procedures, welder qualifications, and testing records, NDE inspections and records, packaging, handling, and storage requirements. The Mechanical Data Sheet (MDS) for these MUs lists their Safety Class as Safety Significant (SS), Quality Level (Q), and Seismic Category (SC-III). The Vendor Fabrication drawings show that each HEPA Filter Housing unit pressure boundary panels exposed to offgas stream are built with 316L stainless steel plate. All other components of the units including structural support frame are built with 316 or 304/304L stainless steel material. The design requirements specified in the codes and specifications are appropriate and adequate for the intended use of these MUs.

Information Assessed		Source of Information	Assessment
Design (cont'd)	If a non-standard Plant Item is to be used, the design calculations demonstrate sound engineering principles of construction.	Material Requisitions and Engineering Specifications listed above under References; ASME AG-1, Code on Nuclear Air and Gas Treatment, American Society of Mechanical Engineers (1997 Edition with ASME AG-1a-2000 Addenda); ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers; 24590-QL-POA-MKH0-00001-18-00005, Rev. 00D, Structural Analysis of Flanders/CSC LVP HEPA Filter Units (LVP-HEPA-00001A/2A/3A and -00001B/2B Housing Units Design Calculation), including 24590-LAW-VDCN-MS-12-00001.	The MUs in the LAW Secondary Offgas System (LVP) noted above are non-standard offgas treatment assemblies that are shop fabricated. The referenced Material Requisition and Specifications require that the ASME AG-1 Code and ASME B&PV Code, Section IX assemblies be delivered after design, fabrication, inspection, and testing. Review of the listed Design Calculation shows that sound engineering principles were used for the design and construction of the HEPA Filter Housings.
	Plant Item has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications and Mechanical Data Sheet listed above under References; ASME AG-1, Code on Nuclear Air and Gas Treatment, American Society of Mechanical Engineers (1997 Edition with ASME AG-1a-2000 Addenda); ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers; ASME B31.3, Process Piping, ASME Code for Process Piping, American Society of Mechanical Engineers; UBC 1997, Uniform Building Code, International Conference of Building Officials; 24590-QL-POA-MKH0-00001-18-00005, Rev. 00D, Structural Analysis of Flanders/CSC LVP HEPA Filter Units (LVP-HEPA-00001A/2A/3A and -00001B/2B Housing Units Design Calculation), including 24590-LAW-VDCN-MS-12-00001.	The LVP Engineering Specification for HEPA Filter Housings and Mechanical Data Sheet require that these MUs including all related components and appurtenances be designed and fabricated in accordance with the applicable sections of ASME AG-1 Code, ASME B&PV Code, Section IX, and ASME B31.3 Code. These codes require specific consideration of operating pressures, temperatures, corrosion allowance, and seismic loads in the design process. The Mechanical Data Sheet identifies the operating pressure and temperature ranges and seismic categories for the subject MUs. Conservatively a corrosion allowances of 0.04" is recommended for these MUs as identified in the MDS document. The UBC 1997 Code specifies the seismic loads for the SC-III equipment. The review of listed Design Calculation and reference documents (inclusive of current design changes as daughter documents) shows that the applicable seismic and other operating loads were appropriately considered in the design process and the MUs will have adequate strength to sustain them during their design-life.

Information Assessed		Source of Information	Assessment
Foundation	Plant Item foundation will maintain the load of a full vessel.	Specifications and Mechanical Data Sheet listed above under References; ASME AG-1, Code on Nuclear Air and Gas Treatment, American Society of Mechanical Engineers (1997 Edition with ASME AG-1a-2000 Addenda); ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications, American Society of Mechanical Engineers; 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design; 24590-QL-POA-MKH0-00001-18-00005, Rev. 00D, Structural Analysis of Flanders/CSC LVP HEPA Filter Units (LVP-HEPA-00001A/2A/3A and -00001B/2B Housing Units Design Calculation), including 24590-LAW-VDCN-MS-12-00001.	The Engineering Specification for HEPA Filter Housings requires the use of ASME AG-1 Code and ASME B&PV Code, Section IX, for their design and fabrication processes. Both of these codes have adequate structural design requirements to ensure proper support for the MUs. The Basis of Design document requires that the supports and foundations shall be designed adequately to sustain all applicable loads including the full weight of the Plant Item. The review of Design Calculation report shows that the structural components (panels and structural framing members) of the HEPA Filter Housings have been designed adequately to handle the applicable full loads of the units. It should be noted that the evaluation of the HEPA Filter Housings foundation (concrete floor slab @ Elev. 48'-0") is not in the scope of this report. However, it is covered under separate integrity assessment report.
	If in an area subject to flooding, the Plant Item is anchored.	Drawings, Specifications, and Mechanical Data Sheet listed above under References; 24590-LAW-DDC-S13T-00028, Rev. 2, Misc. Equipment Anchorage (including ECCN # 00056).	As shown on the referenced drawings, the MUs included in this assessment are located on the 48'-0" floor elevation of the LAW facility. The Mechanical Data Sheet lists that submergence condition does not apply to these MUs, therefore, they need not be evaluated for any buoyant forces. However, in order to sustain any other applicable loads such as seismic loads, these units mounted on the raised pads are adequately anchored to the concrete floor slab as shown on the drawings and in the Misc. Equipment Anchorage calculation documents.

Information Assessed		Source of Information	Assessment
Foundation (cont'd)	Plant Item system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.	The Structural Design Criteria document requires that all structural foundations extend into the surrounding soil below the 30 inch frost line in order to preclude frost heave. As shown on the referenced general arrangement drawings, the MUs considered in this assessment are installed in the LAW facility at Floor Elev. 48'-0" which is not subject to frost heave. Therefore, the subject MUs 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)	System Description and Mechanical Data Sheet listed above under References; 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; 24590-WTP-M4C-V11T-00004, Rev. C, Calculation of Hydrogen Generation Rates and Times to Lower Flammability Limit for WTP.	The Mechanical Data Sheet presents the operating temperatures and pressures for MUs within the scope of this assessment. The System Description document identifies the offgas being handled by the MUs as hazardous, but not ignitable or flammable. The main safety function of the LVP system MUs is to prevent the escape of toxic and hazardous gas vapors to the environment, from the LAW Secondary Offgas System. MU component's design is required to provide an intact housing pressure boundary during normal and abnormal operations and during and after design level seismic events. Waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are appropriately addressed in the Control of Toxic Vapors and Emissions document and Prevention of Hydrogen Accumulation document. The System Description and Control of Toxic Vapors and Emissions documents describe that the LAW HEPA Filters remove toxic and radioactive particulates and aerosols to protect downstream equipment from contamination from the LAW LVP exhaust system. The Prevention of Hydrogen Accumulation document indicates that MUs in the LAW facility are not expected to generate hydrogen gas, therefore, they do not pose any hydrogen accumulation hazard. It is also substantiated in the Calculation for Hydrogen Generation Rates document that hydrogen generation is a liquid-phase phenomenon and since these MUs are a dry offgas system, hydrogen generation should not be an issue.

Information Assessed		Source of Information	Assessment
Waste Characteristics (cont'd)	Plant Item is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	Mechanical Data Sheet and System Description listed above under References.	The Mechanical Data Sheet adequately demonstrates the incorporation of identified waste characteristics into the MU design. Normal and abnormal operating conditions are discussed in the System Description. No reagents are added to the exhaust gases.
Compatibility	The waste types are compatible with each other.	System Description listed above under References.	The MUs herein assessed draw gases from the LAW melters and the process vessels to remove toxic and radioactive particulates and aerosols from the offgas constituents to protect the downstream equipment from contamination. The System Description document does not identify any compatibility issues relating to the offgas constituents listed above. Therefore, there are no concerns for compatibility of waste types.
	Plant Item 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).	Mechanical Data Sheet, Drawings, and System Description listed above under References; ASME AG-1, Code on Nuclear Air and Gas Treatment, American Society of Mechanical Engineers (1997 Edition with ASME AG-1a-2000 Addenda).	The stainless steel material selected as indicated in the Mechanical Data Sheet (MDS) serves it purpose being corrosion resistant for the anticipated environment. Based upon these considerations, 316L stainless steel material was chosen for the HEPA Filter Housings components directly exposed to the offgas stream and the drawings show that this material is used for fabrication. The material selection and their thicknesses with built in margin of safety enveloping conservative corrosion allowance are adequate for these MUs. The MDS and drawings also show that the material used for sealing gaskets, Silicone (ASTM D1056) is an ASTM AG-1 approved material appropriate for the intended service. As these units operate in generally dry and actively ventilated conditions, external corrosion is not considered to be an issue. Therefore, the materials selected are adequate to provide the required 40-year service life as specified in System Description and Mechanical Data Sheet documents.

Information Assessed		Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the Plant Item.	Mechanical Data Sheet listed above under References.	The HEPA Filter Housing units will be operating in dry environments, therefore, no corrosion will be present in and around them and hence there is no evaluation of any known corrosive environment elements. However, the Mechanical Data Sheet document conservatively specifies a corrosion allowance of 0.04" for 40-year service life of the HEPA Filter Housings. This is appropriate for the equipment built with 316L stainless steel material and operating under dry-air conditions without any condensation.
Pressure Controls	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the Plant Item are exceeded.	System Description listed above under References.	The System Description provides a discussion of Normal and Off-Normal operations of the LAW Secondary Offgas LVP System. During normal operations the system is expected to run with little intervention. However, during Off Normal operation, the reduced pressure drop across HEPA Filter in secondary housings may indicate failure. Alarms will notify the operators for investigation of delta pressure reading and manual switching to secondary filter train upon the confirmation of failure. The failed filters are replaced and the primary train is placed back in service. Increase in pressure drop across HEPA Filters will be continuously monitored and scheduled for changing at a specified preset delta pressure level limit. The pressure monitors and controls described above are adequate to prevent exceeding the pressure design limits of the HEPA Filter Housing units.