



ISSUED BY
APP-WTP PDC

24590-CM-HC4-HXYG-00240-02-00004

REV 00A

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 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.

**SUBCONTRACT SUBMITTAL
REVIEW NOT REQUIRED**



AFS-12-0113

May 3, 2012

Ms. Trina A. Howard
Subcontracts Administrator
Bechtel National RPP-WTP Project
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Howard:

**BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00240
IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB RLD
LAB AREA SINK DRAIN COLLECTION VESSEL (RLD-VSL-00164) AND HOT CELL
DRAIN COLLECTION VESSEL (RLD-VSL-00165) – IA-3007244-000**

The structural 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', with a large, sweeping flourish extending to the right.

Fred R. Renz
Contract Management
AREVA Federal Services LLC
Richland Office

llm

Enclosure (1)

cc: D. C. Pfluger, MS 5-1 w/enclosures (2)

AREVA Federal Services LLC

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**IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT
FOR LAB RLD
LAB AREA SINK DRAIN COLLECTION VESSEL (RLD-VSL-00164) AND
HOT CELL DRAIN COLLECTION VESSEL (RLD-VSL-00165)**

"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 LAB Area Sink Drain Collection Vessel (RLD-VSL-00164) and Hot Cell Drain Collection Vessel (RLD-VSL-00165), 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 fifteen (15) pages numbered one (1) through fifteen (15).



T. Hundal
Signature

5/3/12
Date

Scope	Scope of this Integrity Assessment	<p>This Integrity Assessment includes the following two vessels located in the Analytical Laboratory Building:</p> <ul style="list-style-type: none">• LAB Area Sink Drain Collection Vessel (RLD-VSL-00164), located in cell A-B003 at Elevation (-) 18'-7" as shown on Drawing 24590-LAB-P1-60-P0007 (see pages 3-9), and• Hot Cell Drain Collection Vessel (RLD-VSL-00165), located in cell A-B004 at Elevation (-) 19'-2" as shown on Drawing 24590-LAB-P1-60-P0007 (see pages 10-15).
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 design fully satisfies the requirements of Washington Administrative Code (WAC), Chapter 173-303 WAC, <i>Dangerous Waste Regulations</i>, Section WAC-173-303-640 (3) (a) through (g) applicable elements of the <i>Tank Systems</i>.</p>	

References	Material Requisitions, Specifications, and Drawings	<p><u>Material Requisitions (MR):</u></p> <p>24590-CM-MRA-MVA0-00010, Rev. 1, Pressure Vessels, High Alloy or Clad-LAB (MS099) (N130) (for vessel RLD-VSL-00164, including Material Requisition Supplement Nos. S0003, S0004, S0005, S0006, S0007, and S0008 to MR Rev. 1); 24590-QL-MRA-MVA0-00008, Rev. 2, Pressure Vessels, Shop Fabricated, Large, QL-LAB (MS004) (N142) (for vessel RLD-VSL-00165, including Material Requisition Supplement No. S0006 to MR Rev. 2).</p> <p><u>Specifications:</u></p> <p>The following Specifications with their respective revision and Specification Change Notices (SCNs) are listed in the above listed Material Requisitions:</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 Criteria for Pressure Vessels; 24590-WTP-3PS-MVB2-T0001, Engineering Specification for Welding of Pressure Vessels, Heat Exchangers, and Boilers; 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.</p> <p><u>Plant Drawings:</u></p> <p>24590-LAB-P1-60-P0007, Rev. 2, Analytical Laboratory General Arrangement Plan at El. (-) 19'-2", Sections E-E, F-F, & G-G; 24590-LAB-P1-60-00010, Rev. 2, Analytical Laboratory General Arrangement Sections A-A, B-B, C-C, & D-D; 24590-LAB-M5-V17T-P0029, Rev. 1, WTP Analytical Laboratory Process Flow Diagram Radioactive Liquid Disposal; 24590-LAB-M6-RLD-00001001, Rev. 1, P & ID-LAB Radioactive Liquid Waste Disposal System - C5 Collection and Transfer; 24590-LAB-M6-RLD-00002001, Rev. 1, P & ID-LAB Radioactive Liquid Waste Disposal System - C3 Collection & Transfer.</p>
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References (Cont'd)	Drawings and Mechanical Data Sheets	<p><u>Vendor Fabrication Drawings (*Bechtel Code 1 Drawings):</u></p> <p>24590-CM-POA-MVA0-00010-01-02, Rev. 00H, Lab Area Sink Drain Collection Vessel (RLD-VSL-000164); 24590-CM-POA-MVA0-00010-01-00006, Rev. 00F, Lab Area Sink Drain Collection Vessel (RLD-VSL-000164); 24590-QL-POC-MVA0-00008-01-00001, Rev. 00G, Hot Cell Drain Collection Vessel (RLD-VSL-000165); 24590-QL-POC-MVA0-00008-01-00002, Rev. 00D, Hot Cell Drain Collection Vessel (RLD-VSL-000165).</p> <p>* Bechtel Code 1 Drawing is an "as fabricated vendor drawing" approved/accepted by Bechtel.</p> <p><u>Mechanical Data Sheets:</u></p> <p>24590-LAB-MVD-RLD-P0164, Rev. 1, Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-MVD-RLD-P0165, Rev. 1, Hot Cell Drain Collection Vessel (RLD-VSL-00165).</p> <p><u>System Description:</u></p> <p>24590-LAB-3YD-RLD-00001, Rev. 4, System Description for the Analytical Laboratory Radioactive Liquid Waste Disposal System (including SDCN # 00005).</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>Specifications, Drawings, and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.</p>	<p>The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 and all appurtenances are designed to the ASME B&PV Code, Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards for the intended use of the vessel. The Mechanical Data Sheet for the vessel identifies it as a Seismic Category (SC-III) equipment. The RLD-VSL-00164 is a vertical vessel with a 102 in. ID and a height of 69 in. from the bottom tangent line to the top tangent line. The vessel's shell is built with 3/8" thick plate and top and bottom Flanged & Dished (F & D) heads are built with 15/16" and 3/8" thick plates, respectively. The vessel is supported on a cylindrical skirt (approx. 1'-10" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. (-) 18'-7". The vessel has internal equipment such as eductors, spray nozzles, and piping that are supported from the vessel's top head. Material for the shell, bottom and top head, and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy) and hereafter referred to as 6% Mo. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content) and is hereafter referred to as 304 stainless steel. The operating volume is to be about 2,740 gallons and the total internal volume is to be about 3,180 gallons.</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>Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers;</p> <p>24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164);</p> <p>24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel</p> <p>24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).</p>	<p>The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 is a standard ASME B&PV Code, Section VIII, Division 1 vessel. The Mechanical Data Sheet requires that the ASME B&PV Code, Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. Review of the Pressure Vessel Calculations shows that the vessel has been designed as a standard vessel per applicable requirements of ASME B&PV Code, Section VIII, Division 1 and other documents listed in the Material Requisition for the vessel. The aforementioned statements and the vendor fabrication drawings reviewed demonstrate that sound engineering principles of construction and fabrication have been used for the vessel.</p>

	Information Assessed	Source of Information	Assessment
<p>Design (cont'd)</p>	<p>Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.</p>	<p>Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers;</p> <p>ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers;</p> <p>24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164);</p> <p>24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel</p> <p>24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).</p>	<p>The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level, and requirements for seismic design. The specifications for the vessel require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B&PV Code, Section VIII, Division 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME B&PV Code, Section VIII, Division 2 design rules to address seismic design and analysis acceptance criteria for the vessel proper and ASME B&PV Code, Section VIII, Division 1 for the vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III & IV Equipment and Tanks. Review of the Pressure Vessel Calculations shows that the vessel has adequate strength after the appropriate consideration of corrosion allowance, operating temperature and pressure, seismic, and other applicable loads have been accounted for. Furthermore, approval and acceptance of the vendor fabrication drawings by Bechtel National Inc. (BNI) is an added assurance that all applicable requirements stated above and as described in documents (including daughter documents) listed in Material Requisition for the vessel have been met.</p>

	Information Assessed	Source of Information	Assessment
Foundation	<p>Vessel foundation will maintain the load of a full vessel.</p>	<p>Specifications listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.</p>	<p>The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for the design of the vessel supports. This code ensures an adequate design for the vessel supports. Review of the Pressure Vessel Calculations shows that the vessel's support skirt has adequate strength to maintain the load of full vessel. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the vessel support must be adequate to support the load from full vessel, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation is part of a separate integrity assessment report for the Secondary Containment of the vessel.</p>
	<p>If in an area subject to flooding, the vessel is anchored.</p>	<p>Specifications listed above under References and Mechanical Data Sheet; 24590-CM-POA-MVA0-00010-05-02, Rev. 00D, Pressure Vessel Calculations of Lab Area Sink Drain Collection Vessel (RLD-VSL-00164); 24590-LAB-VDCN-MS-11-00002, Revise Supplier Calculation for CM LAB RLD Collection Vessel 24590-LAB-MV-VSL-00164 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).</p>	<p>The Specification for Pressure Vessel Design and Fabrication requires the anchors be designed to secure the buoyant vessel in case the vessel is submerged to the level indicated in the Mechanical Data Sheet (MDS). The MDS does not indicate any submerged conditions for the vessel. However, review of the Pressure Vessel Calculations and Vessel Anchorage Calculation of the vessel shows that the vessel is adequately anchored to the concrete floor to sustain the buoyant and other applicable forces on the empty and full vessel.</p>
	<p>Vessel system will withstand the effects of frost heave.</p>	<p>24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.</p>	<p>The Structural Design Criteria document requires that all structural foundations extend a distance below grade that exceeds the depth of the 30" frost line. The vessel is located inside/interior of the building at below grade elevation {(-) 18'-7"}, therefore, the vessel foundation is not subject to frost heave.</p>

	Information Assessed	Source of Information	Assessment
Waste Characteristics	<p>Characteristics of the waste to be stored or treated have been identified (ignitable, reactive, toxic, specific gravity, vapor pressure, flash point, storage temperature)</p>	<p>Mechanical Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel); 24590-WTP-PSAR-ESH-01-002-01, Rev. 4t, Preliminary Documented Safety Analysis to Support Construction Authorization; General Information; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems And Miscellaneous Treatment Unit Systems.</p>	<p>The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Documented Safety Analysis report as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has mixing eductors to mitigate any sludge buildup and the vessel is actively vented via the LAB vent system to prevent any build-up of flammable gases. Prevention of Hydrogen Accumulation document shows that the contents of the vessels are not expected to generate hydrogen gas that would accumulate 1% by volume (i.e., 25% of the LFL) in the headspace. Therefore, this vessel does not pose hydrogen accumulation hazard. The vessel is also grounded to control ignition sources.</p>
	<p>Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.</p>	<p>System Description listed above under Reference; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).</p>	<p>The System Description discusses normal and abnormal operations for the RLD vessels. Diluted acid or water will be used for flushing/rinsing. The Plant Item Material Selection Data Sheet demonstrates that the 6% Mo material selected for vessel design is appropriate to process, treat or store the waste discussed above.</p>
	<p>The waste types are compatible with each other.</p>	<p>System Description listed above under Reference.</p>	<p>The System Description for the LAB (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessel's primary function is to collect, contain, and transfer liquid streams.</p>

Information Assessed		Source of Information	Assessment
Corrosion Protection	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)	Drawings, Mechanical Data Sheet and System Description listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).	The Plant Item Material Selection Data Sheet shows that the LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 normally operates at a pH range of 6 to 8 and at a temperature of 78°F. The vessel is designed for a 15 psig pressure and a temperature of 240°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheet. Potential acid cleaning operations of the vessel were also considered. The materials selected are 6 % Mo and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAB cell (A-B003) at Elevation (-) 18'-7". The vessel's support skirt material is 304 stainless steel. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives waste from Floor Drain Collection Vessel (RLD-VSL-00163) and various floor and sink drains in the LAB facility for short term storage, and transfers it to the LAB Hot Cell Drain Collection Vessel (RLD-VSL-00165) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; 24590-LAB-N1D-RLD-P0002, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00164 (LAB) Lab Area Sink Drain Collection Vessel (RLD C3 Vessel).	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo material for the vessel with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.
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 listed above under References.	The RLD system LAB Area Sink Drain Collection Vessel, RLD-VSL-00164 is designed to have unrestricted overflow through an 8" pipe line to the cell sump (RLD-SUMP-00041) as shown on the drawings and described in the System Description document. The sump contents will be transferred via pump (RLD-PMP-00182A/B) to the LAB Hot Cell Drain Collection Vessel (RLD-VSL-00165) for further processing. The vessel is also connected to the LAB vent system via an 8" pipe vent line to prevent its over pressurization.

	Information Assessed	Source of Information	Assessment
Design	<p>Vessel design standards are appropriate and adequate for the vessel's intended use.</p>	<p>Specifications, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers.</p>	<p>The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 and all appurtenances are designed to the ASME B&PV Code, Section VIII, Division 1 rules which are appropriate for pressure vessels operating with mixed waste solutions over the pressure and temperature ranges specified for this vessel. Supplementary requirements are specified in the Engineering Specification for Pressure Vessel Design and Fabrication. Supplementary requirements address pressure vessel fatigue analysis, positive material identification, lifting attachment design, equipment drop evaluation, fabrication tolerances, acceptable welding procedures for the vessel and appurtenances, welder qualifications and testing records, NDE inspections and records, and lifting, packaging, shipping, handling and storage requirements. These are adequate and acceptable design standards for the intended use of the vessel. The Mechanical Data Sheet for the vessel identifies it as a Seismic Category (SC-III) equipment. The RLD-VSL-00165 is a vertical vessel with a 192 in. ID and a height of 28.75 in. from the bottom tangent line to the top tangent line. The vessel's top and bottom Flanged & Dished (F & D) heads are built with 0.715" thick plate. Vessel's shell is built with 0.688" thick plate. The vessel is supported on a cylindrical skirt (approx. 3'-1" high) which in turn is supported on a base plate anchored to the concrete floor at Elev. (-) 19'-2". The vessel has internal equipment such as eductors, spray nozzles, and piping that are supported from the vessel's top head. Material for the shell, bottom and top head, and the vessel's internal equipment is UNS N08367 (6% Molybdenum stainless steel alloy) and hereafter referred to as 6% Mo. The supporting skirt is specified as SA-240 304 stainless steel plate (0.030% maximum carbon content, dual certified) and is hereafter referred to as 304 stainless steel. The operating volume is to be about 6,615 gallons and the total internal volume is to be about 9,100 gallons.</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>Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References;</p> <p>ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165).</p>	<p>The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 is a standard ASME B&PV Code, Section VIII, Division 1 vessel. The Mechanical Data Sheet requires that the ASME B&PV Code, Section VIII, Division 1 vessel be delivered after design, fabrication, inspection and testing with an ASME code stamp and that the vessels be nationally registered. Supplemental design information is provided by the reference documents listed in the Source of Information column for utilizing sound engineering principles of construction of the vessels. Review of the Design Report of the vessel shows that it has been designed as a standard vessel per applicable requirements of ASME B&PV Code, Section VIII, Division 1 and other documents listed in the Material Requisition for the vessel. The aforementioned statements and the vendor fabrication drawings reviewed demonstrate that sound engineering principles of construction and fabrication have been used for the vessel.</p>

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Vessel has adequate strength, after consideration of the corrosion allowance, to withstand the operating pressure, operating temperature, and seismic loads.	Specifications, Material Requisition, Drawings, and Mechanical Data Sheet listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 2, Alternate Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).	The Mechanical Data Sheet identifies the vessel's operating pressure and temperature ranges, the materials selected for the vessel, the corrosion allowance, and the vessel quality level, and requirements for seismic design. The design specifications for the vessels require specific consideration of the operating pressures and temperatures and seismic loads in the design process. ASME B&PV Code, Section VIII, Division 1 requires that corrosion allowance thickness shall be excluded from nominal vessel thickness when evaluating the adequacy of vessel components for these loads at end of life. The Engineering Specification for Seismic Qualification Criteria for Pressure Vessels adopts ASME B&PV Code, Section VIII, Division 2 design rules to address seismic design and analysis acceptance criteria for the vessel proper and ASME B&PV Code, Section VIII, Division 1 for the vessel supports. Detailed requirements for seismic load determination are furnished in the specification for Seismic Category III & IV Equipment and Tanks. Review of the Design Report of the vessel shows that it has adequate strength after the appropriate consideration of corrosion allowance, operating temperature and pressure, seismic, and other applicable loads have been accounted for. Furthermore, approval and acceptance of the vendor fabrication drawings by Bechtel National Inc. (BNI) is an added assurance that all applicable requirements stated above and as described in documents (including daughter documents) listed in Material Requisition for the vessel have been met.

	Information Assessed	Source of Information	Assessment
Foundation	<p>Vessel foundation will maintain the load of a full vessel.</p>	<p>Specifications listed above under References; ASME Boiler and Pressure Vessel (B&PV) Code, Section VIII, Division 1, Rules for Construction of Pressure Vessels, American Society of Mechanical Engineers; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation); 24590-WTP-DB-ENG-01-001, Rev. 1Q, Basis of Design.</p>	<p>The Engineering Specification for Pressure Vessel Design and Fabrication requires the use of ASME B&PV Code, Section VIII, Division 1 for the design of the vessel supports. This code ensures an adequate design for the vessel supports. Review of the Design Report of the vessel shows that the vessel's support skirt has adequate strength to maintain the load of full vessel. Furthermore, Chapter 14 of the Basis of Design document requires that the foundation underlying the vessel support must be adequate to support the loads from full vessel, which is out of scope of this assessment. The assessment of the adequacy of the underlying foundation is part of a separate integrity assessment report for the Secondary Containment of the vessel.</p>
	<p>If in an area subject to flooding, the vessel is anchored.</p>	<p>Specifications listed above under References and Mechanical Data Sheet; 24590-QL-POC-MVA0-00008-02-00002, Rev. 00C, Design Report of the Hot Cell Drain Collection Vessel (RLD-VSL-00165); 24590-LAB-VDCN-MS-11-00003, Revise Supplier Calculation for LAB Hot Cell RLD Collection Vessel 24590-LAB-MV-VSL-00165 to Incorporate IQRPE Comments (Vessel Anchorage Calculation).</p>	<p>The Specification for Pressure Vessel Design and Fabrication requires the anchors be designed to secure the buoyant vessel in case the vessel is submerged to the level indicated in the Mechanical Data Sheet (MDS). The MDS does not indicate any submerged conditions for the vessel. However, review of the Design Report and Vessel Anchorage Calculation of the vessel shows that the vessel is adequately anchored to the concrete floor to sustain the buoyant and other applicable forces on the empty and full vessel.</p>
	<p>Vessel system will withstand the effects of frost heave.</p>	<p>24590-WTP-DC-ST-01-001, Rev. 13, Structural Design Criteria.</p>	<p>The Structural Design Criteria document requires that all structural foundations extend a distance below grade that exceeds the depth of the 30" frost line. The vessel is located inside/interior of the building at below grade elevation {(-) 19'-2"}, therefore, the vessel foundation is not subject to frost heave.</p>

Information Assessed		Source of Information	Assessment
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)	<p>Mechanical Data Sheet listed above under References;</p> <p>24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel; 24590-WTP-PSAR-ESH-01-002-01, Rev. 4t, Preliminary Documented Safety Analysis to Support Construction Authorization: General Information; 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems And Miscellaneous Treatment Unit Systems.</p>	<p>The Mechanical Data Sheet presents the waste specific gravity, storage temperatures and pressures. The Plant Item Material Selection Data Sheet addresses the pH range and chemical composition of the waste to select appropriate vessel materials and specify the corrosion allowance. Other waste characteristics that are hazardous, such as ignitability, reactivity, and toxicity are addressed by the Preliminary Documented Safety Analysis report as an integral part of the design process. The RLD vessels provide primary confinement of the waste during normal operations, abnormal operations and during and after a Design Basis Earthquake. The vessel has continually mixing eductors to mitigate any sludge buildup and the vessel is actively vented via the LAB vent system to prevent any build-up of flammable gases. Prevention of Hydrogen Accumulation document shows that the contents of the vessels are not expected to generate hydrogen gas that would accumulate 1% by volume (i.e., 25% of the LFL) in the headspace. Therefore, this vessel does not pose hydrogen accumulation hazard. The vessel is also grounded to control ignition sources.</p>
Waste Characteristics	Vessel is designed to store or treat the wastes with the characteristics defined above and any treatment reagents.	<p>System Description listed above under Reference;</p> <p>24590-LAB-N1D-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.</p>	<p>The System Description discusses normal and abnormal operations for the RLD vessels. Diluted acid or water will be used for flushing/rinsing. The Plant Item Material Selection Data Sheet demonstrates that the 6% Mo material selected for vessel design is appropriate to process, treat or store the waste discussed above.</p>
Waste Characteristics	The waste types are compatible with each other.	System Description listed above under Reference.	<p>The System Description for the LAB (RLD) does not describe any operations where incompatible wastes are mixed in these vessels for processing. The RLD vessel's primary function is to collect, contain, and transfer liquid streams.</p>

Information Assessed		Source of Information	Assessment
Corrosion Protection	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)	Drawings, Mechanical Data Sheet, and System Description listed above under References; 24590-LAB-NID-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.	The Plant Item Material Selection Data Sheet shows that the Hot Cell Drain Collection Vessel, RLD-VSL-00165 normally operates at a pH range of 6 to 8 and at a temperature of 78°F. The vessel is designed for a 15 psig pressure and a temperature of 240°F. Other pertinent vessel operation and design information is provided in the Mechanical Data Sheet. Potential acid cleaning operations of the vessel were also considered. The material selected is 6 % Mo and a corrosion allowance of 0.04 in. The RLD vessel is located in the LAB cell (A-B004) at Elevation (-) 19'-2". The vessel's support skirt material is 304 stainless steel. This cell is equipped with a sump to pump out any leaks. Therefore, the cell should remain dry during normal operations which will limit external corrosion of the vessel over the facility design life. The RLD vessel receives waste from Floor Drain Collection Vessel (RLD-VSL-00163) and cell sump, Lab Area Sink Drain Collection Vessel (RLD-VSL-00164) and cell sump, and various floor and sink drains in the LAB facility for short term storage, and transfers it to the PTF plant wash disposal vessel (PWD-VSL-00044 or PWD-VSL-00033) for further processing.
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the vessel.	Mechanical Data Sheet listed above under References; 24590-LAB-NID-RLD-P0003, Rev. 1, Plant Item Material Selection Data Sheet, RLD-VSL-00165 (LAB) Hot Cell Drain Collection Vessel.	The bases for the RLD vessel's material selection and corrosion allowance are furnished in the Plant Item Material Selection Data Sheet. Selection of 6% Mo material for the vessel with a corrosion allowance of 0.04 in. for a service life of 40 years is adequate and appropriate. The material selections and corrosion allowances are carried forward to the Mechanical Data Sheet consistently and correctly.
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 listed above under References.	The RLD system Hot Cell Drain Collection Vessel, RLD-VSL-00165 is designed to have unrestricted overflow through a 6" dip pipe to the cell sump (RLD-SUMP-00042) as shown on the drawings and described in the System Description document. The sump contents will be transferred via pump (RLD-PMP-00183A/B) to the PTF plant wash disposal vessel (PWD-VSL-00044 or PWD-VSL-00033) for further processing. The vessel is also connected to the LAB vent system via a 6" pipe vent line to prevent its over pressurization.