ISSUED BY
RPP-WTP PDC

R11107793

AREVA

CCN 200253

AFS-09-0298

September 11, 2009

Ms. Jennifer Broadbent
Subcontract Administrator
Bechtel National, Inc.
2435 Stevens Center Place
Richland, Washington 99354

Dear Ms. Broadbent:

BECHTEL NATIONAL, INC. CONTRACT NO. 24590-CM-HC4-HXYG-00211
IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB
RLD ANCILLARY EQUIPMENT (IA-3001891-001) Supersedes CCN # 200245

The structural integrity assessment of the subject ancillary equipment 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 ancillary equipment is adequately designed and has sufficient structural strength, compatibility with the waste(s) to be processed/stored/treated, and corrosion protection to ensure that it 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
Contract Management
AREVA Federal Services LLC
Richland Office

llm

Enclosure (1)

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

AREVA Federal Services LLC
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IA-3001891-001

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB RLD ANCILLARY EQUIPMENT

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.

IA-3001891-001

IQRPE STRUCTURAL INTEGRITY ASSESSMENT REPORT FOR LAB RLD ANCILLARY EQUIPMENT

"I, Tarlok 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 Radioactive Liquid Waste Disposal (RLD) System Ancillary Equipment, 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).

TARLOK SINGH HUNDAL
STATE OF WASHINGTON
20213
PROFESSIONAL ENGINEER

T Hundal

Signature

9/11/09

Date

Scope	Scope of this Integrity Assessment	This report consists of the Integrity Assessment for the Dangerous Waste Permit (DWP) effecting ancillary equipment associated with the LAB RLD system components to be located in various LAB facility rooms at below grade elevation, as shown in the General Arrangement drawing 24590-LAB-P1-60-00007. The DWP affecting ancillary equipment for the RLD system is shown in the P&ID drawings listed here and under References below. The ancillary equipment assessed is associated with the following plant items and/or components: 1. Ancillary equipment associated with the Hot Cell Drain Collection Vessel (RLD-VSL-00165) as shown on Drawing No. 24590-LAB-M6-RLD-00001; 2. Ancillary equipment associated with the LAB Area Sink Drain Collection Vessel (RLD-VSL-00164) as shown on Drawing No. 24590-LAB-M6-RLD-00002; 3. Ancillary equipment that comprises the LAB RLD Disposal System C3 Rad Lab Collection Header system as shown on Drawing No. 24590-LAB-M6-RLD-00006; 4. Ancillary equipment associated with the LAB RLD Disposal System – C3 Collection & Leak Detection functions as shown on Drawing No. 24590-LAB-M6-RLD-00007; 5. Ancillary equipment associated with the LAB RLD Disposal System – C5 Collection & Leak Detection functions as shown on Drawing No. 24590-LAB-M6-RLD-00008. Note: Direct buried outside underground double-wall transfer lines shown on the above drawings are outside the scope of this integrity assessment. Their integrity assessment is included in a separate report.
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,* WAC-173-303-640, *Tank Systems.*

References	Material Requisition, Specifications, Mechanical System Data Sheet, System Description, and Drawings	Material Requisition (MR): 24590-CM-MRA-MPC0-00005, Rev. 2, Pumps, Centrifugal Sealless (MS072)(N012) Specifications: The following Specifications with their respective revision and Specification Change Notices (SCNs) are identified in the above listed Material Requisition document: 24590-WTP-3PS-MPC0-T0002, Engineering Specification for General Centrifugal Pumps to Meet Requirements of ASME B37.1M-2001 and ASME B73.2M-2003 for Commercial (CM) Components; 24590-WTP-3PS-MUMI-T0002, Engineering Specification for Low Voltage Induction Motors; 24590-WTP-3PS-G000-T0001, General Specification for Supplier Quality Assurance Program Requirements; 24590-WTP-3PS-FB01-T0001, Engineering Specification for Structural Design Loads for Seismic Category III/IV Equipment and Tanks; 24590-WTP-3PS-G000-T0002, Engineering Specification for Positive Material Identification (PMI) for Shop Fabrication. Mechanical System Data Sheet: 24590-LAB-MPD-RLD-00001, Rev. 1, ASME/ANSI General Cenrtifugal Pump (Hotcell Drain Collection Vessel Pump, LAB-RLD-PMP-00183A/B). System Description: 24590-LAB-3YD-RLD-00001, Rev. 3, System Description for the Analytical Laboratory Radioactive Liquid Waste Disposal System. Vendor Drawing (Bechtel Code 1 Drawing*): 24590-CM-POA-MPC0-00005-03-00002, Rev. 00B, SPGS Pump Range. * Code 1 Drawing means vendor drawing approved by Bechtel. Plant Drawings including associated (DCNs): 24590-LAB-P1-60-00007, 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, and D-D; 24590-LAB-M5-V17T-00029, Rev. 3, WTP Analytical Laboratory Process Flow Diagram Radioactive Liquid Disposal; 24590-LAB-M6-RLD-00001, Rev. 1, P&ID – LAB Radioactive Liquid Waste Disposal System C5 Collection and Transfer (DCN 00054); 24590-LAB-M6-RLD-00002, Rev. 1, P&ID – LAB Radioactive Liquid Waste Disposal System C3 Collection and Transfer; 24590-LAB-M6-RLD-00006, Rev. 2, P&ID – LAB Radioactive Liquid Waste Disposal System C3 Rad Lab Collection; 24590-LAB-M6-RLD-00007, Rev. 1, P&ID – LAB Radioactive Liquid Waste Disposal System C3 Collection & Leak Detection; 24590-LAB-M6-RLD-00008, Rev. 1, P&ID – LAB Radioactive Liquid Waste Disposal System C5 Collection & Leak Detection (DCN 00054).

Reference (cont'd)	Drawings	24590-LAB-P3-RLD-ZN03413001, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-03413-N11E-4); 24590-LAB-P3-RLD-ZN00001011, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-00001-W11B-4); 24590-LAB-P3-RLD-ZN00001012, Rev. 4, LAB Facility Isometric (Line No. RLD-ZN-00001-W11B-4); 24590-LAB-P3-RLD-ZN02205001, Rev. 5, LAB Facility Isometric (Line No. RLD-ZN-02205-S11E-3); 24590-LAB-P3-RLD-ZN03393001, Rev. 0, LAB Facility Isometric (Line No. RLD-ZN-03393-S11E-4); 24590-LAB-P3-RLD-WU22122001, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-22122-S11E-6); 24590-LAB-P3-RLD-WU02198001, Rev. 3, LAB Facility Isometric (Line No. RLD-WU-02198-W11B-3); 24590-LAB-P3-RLD-WU02198002, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02198-W11B-3); 24590-LAB-P3-RLD-WU02198051, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02198-W11B-6); 24590-LAB-P3-RLD-WU02198052, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02198-W11B-6); 24590-LAB-P3-RLD-WU02198053, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02198-W11B-6); 24590-LAB-P3-RLD-WU02269001, Rev. 2, LAB Facility Isometric (Line No. RLD-WU-02269-W11B-2); 24590-LAB-P3-RLD-WU02269051, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02269-W11B-4); 24590-LAB-P3-RLD-WU02270001, Rev. 2, LAB Facility Isometric (Line No. RLD-WU-02270-W11B-3); 24590-LAB-P3-RLD-WU02270051, Rev. 0, LAB Facility Isometric (Line No. RLD-WU-02270-W11B-6); 24590-LAB-P3-RLD-WU02279051, Rev. 0, LAB Facility Isometric (Line No. RLD-WU-02279-W11B-6); 24590-LAB-P3-RLD-WU02224051, Rev. 0, LAB Facility Isometric (Line No. RLD-WU-02224-S32B-6); 24590-LAB-P3-RLD-WU02249001, Rev. 1, LAB Facility Isometric (Line No. RLD-WU-02229-S11E-1); 24590-LAB-P3-RLD-ZN03433001, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-3); 24590-LAB-P3-RLD-ZN03433002, Rev. 2, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-3); 24590-LAB-P3-RLD-ZN03433005, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-3); 24590-LAB-P3-RLD-ZN03433051, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-6); 24590-LAB-P3-RLD-ZN03433056, Rev. 3, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-8); 24590-LAB-P3-RLD-ZN03433059, Rev. 1, LAB Facility Isometric (Line No. RLD-ZN-03433-S32B-4); 24590-LAB-P3-RLD-ZN03449002, Rev. 0, LAB Facility Isometric (Line No. RLD-ZN-03449-S32B-2); 24590-LAB-P3-RLD-ZN03449052, Rev. 0, LAB Facility Isometric (Line No. RLD-ZN-03449-S32B-4); 24590-LAB-P3-RLD-WU02213001, Rev. 0, LAB Facility Isometric (Line No. RLD-WU-02213-S11E-8); 24590-LAB-PH-P33T-00001, Rev. 1, Pipe Support and Fabrication Details; 24590-LAB-PH-P33T-00002, Rev. 1, Pipe Support and Fabrication Details; 24590-LAB-PH-P33T-00003, Rev. 1, Pipe Support and Fabrication Details; 24590-WTP-PH-50-00003001, Rev. 4, Standard Pipe Support Details, Cantilever-Cantilever CC; 24590-WTP-PH-50-00012001, Rev. 6, Standard Pipe Support Details, Guide-U Bolts GU; 24590-WTP-PH-50-00012002, Rev. 5, Standard Pipe Support Details, Guide-U Strap GU; 24590-WTP-PH-50-00024001, Rev. 2, Standard Pipe Support Details, Strut-Sway WS; 24590-LAB-RLD-H00098, Rev. 2, Pipe Support Drawing; 24590-LAB-RLD-H00394, Rev. 1, Pipe Support Drawing.

	Information Assessed	Source of Information	Assessment
Design	Ancillary equipment design standards are appropriate and adequate for the equipment's intended use.	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers, 1996; 24590-WTP-3DP-G04T-00905, Rev. 10, Determination of Quality Levels.	The Pipe Stress Design Criteria document identifies ASME B31.3 Code as the design code for piping systems of the WTP The P&ID drawings and the System Description document indicate that ancillary equipment associated with the C3/C5 collection, transfer and leak detection functions is Quality Level CM (Commercial Grade) and Seismic Category (SC-III/IV), for personnel protection from hazardous materials. These seismic categories are discussed in detail in the Pipe Stress Design Criteria document. Determination of Quality Levels document and Pipe Stress Design Criteria document provide detailed discussion of quality grades and seismic categories, respectively. The codes, standards, and documents identified and used above are acceptable and adequate for the design of the LAB RLD system ancillary equipment's intended service.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	If the ancillary equipment to be used is not built to a design standard, the design calculations demonstrate sound engineering principles of construction.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev. 6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers, 1996; 24590-WTP-VV-PS-01-001, Rev. 6, Verification and Validation Test Plan/Test Report for ME101, Linear Elastic Analysis of Piping; 24590-LAB-M6C-RLD-00001, Rev. B, (including ECCN # 00004) LAB RLD Pump and Line Sizing (Calculations); 24590-LAB-P6C-RLD-00004, Rev. A, Richland RPP-WTP. Non-Rad Liquid Waste System (Pipe Stress Analysis); 24590-LAB-P6C-RLD-00006, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00041, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00045, Rev. B, Richland RPP-WTP LAB Plant RLD System (Pipe Stress Analysis); 24590-LAB-P6C-RLD-00046, Rev. B, Richland RPP-WTP LAB Plant RLD System (Pipe Stress Analysis); 24590-LAB-P6C-RLD-00060, Rev. A, Richland RPP-WTP. Non-Rad Liquid Waste System (Pipe Stress Analysis); 24590-WTP-PHC-P50-00001, Rev. 1, RPP/WTP Support Standards (Calculations); 24590-WTP-3DP-G04T-00906, Rev. 7A, Isometric Drawings and Associated Calculations; 24590-WTP-3DP-G04B-00037, Rev. 15A, Engineering Calculations; 24590-WTP-3PS-PH01-T0002, Rev. 4, Installation of Pipe Supports.	The ancillary equipment is to be built to the design standards. The Pipe Stress Design Criteria specifies that piping is to be designed in accordance with ASME B31.3 Code. The review of the sample isometric and pipe support drawings listed in the References, Pipe Stress Analysis, Pipe Support Calculations, Engineering Specification, Pump and Line Sizing calculations, and of the design process and controls described in Isometric Drawings and Associated Calculations, Engineering Calculations, and Installation of Pipe Supports documents provides adequate assurance that RLD ancillary equipment are properly designed and will be installed and verified to meet the requirements of the applicable design criteria established for the project. The review of the aforementioned documents also demonstrates that sound design engineering principles are used for the design and construction of the ancillary equipment.

	Information Assessed	Source of Information	Assessment
Design (cont'd)	Ancillary equipment has adequate strength at the end of its design life to withstand the operating pressure, operating temperature, thermal expansion, and seismic loads. Equipment is protected against physical damage and excessive stress due to settlement, vibration, expansion, or contraction.	Drawings and System Description listed above under References; 24590-WTP-DC-PS-01-001, Rev. 6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers, 1996; ASME Boiler and Pressure Vessel (B&PV) Code, Section III, Division 1, Rules for Construction of Nuclear Facility Components, Subsection NC, and Appendix F, American Society of Mechanical Engineers, 1995; Uniform Building Code (UBC), 1997 Edition, International Conference of Building Officials; 24590-WTP-PER-M-02-002, Rev. 2, Materials for Ancillary Equipment; 24590-WTP-GPG-ENG-004, Rev. 2A, Design Guide Pipe Stress, Pipe Layout, and Support Spacing; 24590-WTP-SE-ENS-03-704, Rev. 0, Safety Evaluation for Design (Seismic Design of Piping and Pipe Supports); 24590-WTP-PHC-P50-00001, Rev. 1, RPP/WTP Support Standards (Calculations). 24590-LAB-M6C-RLD-00022, Rev. C, (including ECCN # 00002 and 00006) LAB RLD System Line Pressure and Temperature Conditions (Calculations); 24590-LAB-P6C-RLD-00006, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00041, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00045, Rev. B, Richland RPP-WTP LAB Plant RLD System (Pipe Stress Analysis); 24590-WTP-DB-ENG-01-001, Rev. 1O, Basis of Design; DOE-STD-1020-94, Natural Phenomenon Hazards Design Evaluation Criteria for Department of Energy Facilities (including Change Notice #1, January 1996).	The Pipe Stress Design Criteria document requires the use of the ASME B31.3 Code and DOE-STD-1020-94 standard document for piping design. ASME B31.3 Code requires explicit consideration of operating pressure, operating temperature, thermal expansion/contraction, settlement, vibration, and corrosion allowance in the design of piping. Elements of the ASME B&PV Code, Section III, Division 1, Subsection NC and Appendix F, and the Uniform Building Code (UBC) are used to supplement the requirements of ASME B31.3 Code and DOE-STD-1020-94 for the design of Seismic Category (SC-III/SC-IV) piping. Details of the seismic design methods are discussed in the Pipe Stress Design Criteria and Safety Evaluation documents. The Basis of Design document specifies that mechanical equipment is to be designed for a nominal plant life of 40 years. Components in non-maintainable areas are to be designed to last the entire design life of the plant. The Materials for Ancillary Equipment document specifies that ancillary equipment downstream of a waste source vessel is to be constructed of the same or better material and with the same corrosion allowance as the source vessel, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Using the same or better materials and corrosion allowance for downstream ancillary equipment ensures that the equipment will be able to withstand all anticipated loadings for the entire design service life. The above mentioned codes and standards including the Design Guide document, ensure that the ancillary equipment has adequate strength at the end of its design life to withstand all anticipated loads. Review of sample ancillary equipment calculations and drawings indicates that they are adequately designed meeting the requirements of the aforementioned applicable code and standards.

	Information Assessed	Source of Information	Assessment
Supports	Ancillary equipment supports are adequately designed.	Drawings listed above under References; 24590-WTP-DC-PS-01-002, Rev. 4, Pipe Support Design Criteria; 24590-WTP-PER-PS-02-001, Rev. 4, Ancillary Equipment Pipe Support Design; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers (1996); ASME Boiler and Pressure Vessel Code, Section III, Division I, Subsection NF, Appendix N and F, Rules for Construction of Nuclear Power Plant Components (2001); 24590-WTP-PL-PS-01-001, Rev. 2, Verification and Validation Test Plan for Bechtel's ME150 Pipe Support Family of Programs (PCFAPPS); 24590-LAB-PHC-RLD-00003, Rev. B, RPP-WTP Engineered Support Calculation for LAB-RLD-H00098 and LAB-RLD-H00079); 24590-LAB-PHC-RLD-00101, Rev. A, RPP-WTP Engineered Support Calculation for LAB-RLD-H00394); 24590-LAB-PHC-P33T-00001, Rev. A, Pipe Support Calculation; 24590-LAB-SSC-S15T-00013, Rev. 0 (including ECCN # 00006), Leak Detection Box Support Design, (Calculations); 24590-WTP-PHC-P50-00001, Rev. 1, RPP/WTP Support Standards (Calculations).	The Pipe Support Design Criteria document considers all loadings identified in ASME B31.3 Code and utilizes ASME Section III, Division 1, Subsection NF and Appendix F to supplement the requirements of ASME B31.3 Code for seismic design of Seismic Category (SC-III/IV) pipe supports. Loads are evaluated against the design criteria provided in ASME Section III, Division 1, as discussed in the Pipe Support Design Criteria document. Bounding load cases are passed to the pipe support designers from the results of the ancillary equipment piping stress analyses. Analysis is by manual calculation or approved computer programs that have been verified and validated as discussed in the Verification and Validation Test Plan. These are appropriate codes and standards that assure adequate design of ancillary equipment supports for the LAB RLD system. Design standards for vessel internal equipment supports are discussed in the integrity assessment for the RLD system vessels. Review of the sample calculation documents shows that the ancillary equipment supports are adequately designed to meet the requirements of the aforementioned coded and standards.

	Information Assessed	Source of Information	Assessment
Connections	Seams and connections are adequately designed.	Drawings listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1O, Basis of Design; 24590-WTP-DC-PS-01-001, Rev. 6, Pipe Stress Design Criteria Including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers (1996); ASME Boiler and Pressure Vessel (B&PV) Code, Section IX, Welding and Brazing Qualifications; ASME B16.5 Code, Piping Flanges and Flanged Fittings, (1988); 24590-LAB-P6C-RLD-00006, Rev. C, Richland Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00041, Rev. C, Richland Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00046, Rev. B, Richland RPP-WTP LAB Plant RLD System (Pipe Stress Analysis).	The Basis of Design specifies that in-cell piping that is non-maintainable will be fully welded. The Pipe Stress Design Criteria specifies the ASME B31.3 Code as the design code for the piping systems. Welding is to be performed in accordance with the requirements of ASME B31.3 Code and the ASME B&PV Code, Section IX. ASME B16.5 Code is specified for pipe flanges and equipment flanges where flanges are used for connections. The aforementioned documents provide appropriate requirements and guidelines to adequately design the seams and connections to sustain the applicable loads. Review of sample ancillary equipment calculations and drawings indicates that they are adequately designed meeting the requirements of the aforementioned applicable code and standards.
Foundation	The system will withstand the effects of frost heave.	Drawings listed above under References; 24590-WTP-DC-ST-01-001, Rev. 12, Structural Design Criteria.	The RLD system ancillary equipment considered in this assessment as shown on the drawings is located in several vessel cells and associated pump and piping pits, and in the building concrete surrounded by the R2/C2 laboratory operations areas, and radiological maintenance and waste handling areas inside the LAB Facility. The Structural Design Criteria requires that all structural foundations shall extend into the surrounding soil below the frost line in order to preclude frost heave. The frost line is 30 in. below grade and the RLD system ancillary equipment is inside the building, therefore, is not subject to the effects of frost heave.

	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, temperature)	Drawings and System Description listed above under References. 24590-WTP-PER-PR-03-001, Rev. 1, Prevention of Hydrogen Accumulation in WTP Tank Systems and Miscellaneous Treatment Unit Systems; 24590-WTP-PER-PR-03-002, Rev. 3, Control of Toxic Vapors and Emissions from WTP Tank and Miscellaneous Treatment Unit Systems.	The System Description identifies that the RLD system vessels provide for receipt and temporary storage of secondary wastes from the Laboratory operations. The System Description identifies that secondary containment for the C5 vessel cell is the only important-to-safety function in the Laboratory Facility. Administrative controls are placed on the radiological inventory in the C5 vessel and addition of organic chemicals to the C5 tank. Therefore the C5 vessel does not represent a hydrogen or chemical flammability hazard. The System Description states that during normal LAB operations, numerous small samples are taken for analysis purposes. Therefore, the quantities of hazardous material being handled by LAB ancillary equipment are typically small, not continuous in time, diluted with water, and flushed back into the system. Various waste characteristics are also discussed in the Control of Toxic Vapors and Emissions and Prevention of Hydrogen Accumulation documents which describe that the LAB RLD system process does not pose any safety or health concerns.

	Information Assessed	Source of Information	Assessment
Waste Characteristics (cont'd)	Ancillary equipment is designed to handle the wastes with the characteristics defined above and any treatment reagents.	Drawings and System Description listed above under References; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description; 24590-WTP-PER-M-02-002, Rev. 2, Materials for Ancillary Equipment.	The RLD system drain manifolds are doubly contained piping to provide for secondary containment of dangerous waste. The System Description document states that during normal operations, samples from the laboratory operations will be neutralized with water and flushed to the RLD system. However, the drain manifolds that are likely to receive any reagents by accident are equipped with the primary piping material UNS N06022 (Hastelloy C-22), a material normally used for highly corrosive service (Pipe Class W11B). Drain manifolds that see less severe service use 316L stainless steel for the primary lines (Pipe Class S32B). The secondary containment lines are typically carbon steel. The line identification numbers on the P&ID drawings include the piping material class for each line. The materials for these classes are tabulated in the Piping Material Class Description document. For ancillary equipment downstream from a vessel, the Materials for Ancillary Equipment document specifies that its material should be same or better as of the waste source vessel and with the same corrosion allowance as the source vessel, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Bounding corrosion/erosion allowances are listed in the Piping Material Class Description document for each piping material class. The aforementioned information ensures that the ancillary equipment is adequately designed to manage the waste and reagents associated with the LAB RLD system

	Information Assessed	Source of Information	Assessment
Compatibility	The pH range of the waste, waste temperature and the corrosion behavior of the structural materials are adequately addressed. Ancillary equipment material and protective coatings ensure the ancillary equipment structure is adequately protected from the corrosive effects of the waste stream and external environments. The protection is sufficient to ensure the equipment will not leak or fail for the design life of the system.	Drawings and System Description listed above under References; 24590-WTP-DB-ENG-01-001, Rev. 1O, Basis of Design; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The Basis of Design document identifies a service design life of 40 years for the ancillary equipment. All non-maintainable items will be designed to last the life of the facility. The System Description document identifies that the waste to be handled in this ancillary equipment as non-organic liquid process waste. It also states that during normal operations samples from the laboratory operations will be neutralized with water and flushed to the RLD system. However, the drain manifolds that are likely to receive reagents by accident are equipped with the primary piping material UNS N06022 (Hastelloy C-22), a material normally used for highly corrosive service. Drain manifolds that see less severe service use 316L stainless steel for the primary lines. As noted on the P&ID drawings, the exterior surface material of the double-wall pipe that penetrate the RLD vessel cells is to be same as the cell secondary containment liner material. Material Selection document lists appropriate materials to be used for the secondary containment liner in the cell. Therefore, the ancillary equipment will provide the expected design service life.

	Information Assessed	Source of Information	Assessment
Corrosion Allowance	Corrosion allowance is adequate for the intended service life of the ancillary equipment.	Drawings listed above under References; 24590-LAB-N1D-RLD-00005, Rev. 0, Corrosion Evaluation, LAB Hotcell Drain Collection Vessel Pump (RLD-PMP-00183A/B); 24590-WTP-DC-PS-01-001, Rev. 6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria;" ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers (1996); 24590-WTP-DB-ENG-01-001, Rev. 1O, Basis of Design; 24590-WTP-PER-M-02-002, Rev. 2, Materials for Ancillary Equipment; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description; 24590-LAB-P6C-RLD-00006, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00041, Rev. C, Pipe Stress Analysis for LAB RLD System; 24590-LAB-P6C-RLD-00046, Rev. B, Richland RPP-WTP LAB Plant RLD System (Pipe Stress Analysis).	The Pipe Stress Design Criteria requires use of the ASME B31.3 Code for ancillary equipment design. Consideration of corrosion allowance is a mandatory requirement of ASME B31.3 Code. A required service life of 40 years is identified in the Basis of Design document for ancillary equipment that is not accessible for maintenance. Those drain manifolds that are likely to receive reagents are equipped with the primary piping material UNS N06022 (Hastelloy C-22), a material normally used for highly corrosive service (Pipe Class W11B-double walled piping). Drain manifolds that see less severe service use 316L stainless steel for the primary lines (Pipe Class S32B-double walled piping). The secondary containment lines are typically carbon steel. Single walled drain lines and transfer lines located in the RLD vessel cells, pumps and piping pits, and other secondary containment components are primary are constructed of piping of Classes S11E and S11P which are 316L stainless steel material. Some N11E (UNS N06022-Hasellow C-22) material is also used for single walled drain lines located inside the LAB secondary containment structures. For ancillary equipment downstream from a vessel, the Materials for Ancillary Equipment document specifies that its material should be same or better as of the waste source vessel and with the same corrosion allowance as the source vessel, unless the service seen in the downstream line warrants a different material, corrosion allowance, or other modification. Bounding corrosion/erosion allowances are listed in the Piping Material Class Description document for each piping material class. The Corrosion Evaluation and selection of materials listed in the Piping Material Class Description document and as shown on drawings, for the ancillary equipment is compatible with the operating environment for their required design life. Review of the sample ancillary equipment documents shows that appropriate corrosion allowances have been used.

	Information Assessed	Source of Information	Assessment
Pressure Controls	Pressure controls (vents and relief valves) are adequately designed to ensure pressure relief if normal operating pressures in the vessels are exceeded.	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev.6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers, 1996; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description.	The Pipe Stress Design Criteria document specifies ASME B31.3 Code as the design code for the WTP piping. Most of the ancillary equipment in the LAB consists of gravity drain manifolds for the laboratory hotcells, gloveboxes, hoods, and maintenance and waste handling areas. ASME B31.3 Code requires provision be made to safely contain or relieve any pressure to which the piping may be subjected. ASME B31.3 Code piping not protected by a pressure relieving device, or that can be isolated from a pressure relieving device must be designed for at least the highest pressure that can be developed. The Piping Material Class Description document lists enveloping pressure and temperature limits for each piping material class. These requirements are appropriate and adequate for the ancillary equipment design.

	Information Assessed	Source of Information	Assessment
Pressure Controls (cont'd)	Maximum flows and any unusual operating stresses are identified	Drawings listed above under References; 24590-WTP-DC-PS-01-001, Rev.6, Pipe Stress Design Criteria including "Pipe Stress Criteria" and "Span Method Criteria"; ASME B31.3 Code, Process Piping, American Society of Mechanical Engineers, 1996; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description. 24590-WTP-3PS-P000-T0001, Rev. 6, Engineering Specification for Piping Material Classes General Description and Summary; 24590-WTP-3DP-G04T-00906, Rev. 7A, Isometric Drawings and Associated Calculations; 24590-WTP-3DP-G04B-00037, Rev. 15A, Engineering Calculations.	The expected flow paths for the ancillary equipment are identified on the P&ID drawings. The Pipe Stress Design Criteria specifies the ASME B31.3 Code for piping design. This code requires piping to be designed to the highest pressure that can be developed in a piping system assuring that maximum operating stresses remain within code allowables. Piping material classes are shown on the P&ID drawings, embedded in the item numbers for each ancillary equipment component. Ancillary equipment is designed for the highest anticipated temperature and pressure values which are also within the bounding maximum design temperature and pressure values listed for each piping material class in the Piping Material Class General Description document. ASME B31.3 and the associated standards are appropriate and adequate for the design of the ancillary equipment. Furthermore, the fabrication or isometric drawings released for construction by Bechtel National, Inc. (BNI), and the design process and controls described in the Isometric Drawings and Associated Calculations, and Engineering Calculations documents provides adequate assurance that subject ancillary equipment are properly designed to meet the requirements identified in the applicable design criteria established for the project.

	Information Assessed	Source of Information	Assessment
Secondary Containment	Ancillary equipment is designed with secondary containment that is constructed of materials compatible with the waste and of sufficient strength to prevent failure (pressure gradients, waste, climatic conditions, daily operations), provided with a leak-detection system, and designed to drain and remove liquids.	Drawings listed above under References; 24590-WTP-PER-PL-02-001, Rev. 6, Piping Material Class Description; 24590-WTP-PER-M-02-001, Rev. 3, Material Selections for Building Secondary Containment/Leak Detection.	The ancillary equipment considered in this assessment is located in several vessel cells and associated pump and piping pits, and in the building concrete surrounded by the R2/C2 laboratory operations areas, and radiological maintenance and waste handling areas inside the LAB Facility. Secondary containment for ancillary equipment within the vessel cells and pits is provided by the liners and sumps within the cells and pits which are outside the scope of this integrity assessment. Secondary containment for the various gravity drain manifolds shown on the P&ID drawings is provided by doubly contained piping arrangements. The primary lines are typically corrosion resistant alloys while the secondary containment pipes are carbon steel as shown on the drawings and as described in the Piping Material Class Description document. All of the manifolds slope toward the RLD vessel cells. The carbon steel secondary containments are all provided with low-point leak detection boxes which are physically located in the cells. Drain manifolds are equipped with "clean outs" to facilitate access for unplugging the lines. Flush water connections are provided at the high points of the drain manifolds. These connections also provide for pneumatic testing of the secondary containment lines and leak detection boxes. The ancillary equipment is designed and constructed per the requirements of Material Selections document. The ancillary equipment material is compatible with the waste, has sufficient strength to prevent failure, provided with leak-detection system, and designed to drain and remove liquids.

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Subcontract Number:	24590-CM-HC4-HXYG-00211
Subcontract Title:	Tank Integrity Design Assessments
Subcontractor Name:	AREVA Federal Services LLC
Subcontract Administrator:	Jennifer Broadbent

PDC Document Number	Rev	Document Title	Rev
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